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DU

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SECONDE SERIE—TOME IX

SÉANCE DE MAI 1903

EN VENTE CHEZ
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1903

PROCEEDINGS

AND

TRANSACTIONS

OF THE

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OF

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SCUDDER, DR. S. H., *Cambridge, Mass., U.S.A.*

RETIRED MEMBERS. (See RULE 7.)

BOURASSA, NAPOLÉON, *St. Hyacinthe, P.Q.*
CALLENDAR, HUGH L., M.A. (Cantab.), F.R.S., *London, Eng.*
CHAPMAN, E. J., Ph.B., LL.D., *London, Eng.*
CHERRIMAN, J. B., M.A., *Ryde, Isle of Wight.*
HAANEL, E., Ph.D., Superintendent of Mines, *Ottawa.*
KIRBY, W., *Niagara, Ont.*
MACGREGOR, J. G., M.A., D.Sc., F.R.S., F.R.S.E., *Edinburgh, Scotland.*
MAIR, CHARLES, *Prince Albert, N.W.T.*
OSLER, W., M.D., Johns Hopkins University, *Baltimore, Md.*
ROBERTS, C. G. D., M.A., *New York.*

LIST OF PRESIDENTS.

1882–'83	Sir J. W. Dawson, Kt.
1883–'84	L'honorable P. J. O. Chauveau.
1884–'85	Dr. T. Sterry Hunt.
1885–'86	Sir Daniel Wilson, Kt.
1886–'87	Monsignor Hamel.
1887–'88	Dr. G. Lawson.
1888–'89	Sir Sandford Fleming, K.C.M.G.
1889–'90	L'abbé Casgrain.
1890–'91	Very Rev. Principal Grant.
1891–'92	L'abbé Laflamme.
1892–'93	Sir J. G. Bourinot, K.C.M.G.
1893–'94	Dr. G. M. Dawson, C.M.G.
1894–'95	Sir J. Macpherson LeMoine, Kt.
1895–'96	Dr. A. R. C. Selwyn, C.M.G.
1896–'97	Most Rev. Archbishop O'Brien.
1897–'98	L'honorable F. G. Marchand
1898–'99	T. C. Keefer, C.M.G.
1899-1900	Rev. Professor Clark, D.C.L.
1900-1901	L. Frechette, C.M.G., LL.D.
1901-1902	President Loudon, LL.D.
1902-1903	Sir James A. Grant, K.C.M.G., M.D., F.G.S.
1903-1904	Lt.-Col. G. T. Denison, B.C,L.

For Rules and Regulations of the Royal Society of Canada, Revised to May 1901, see beginning of Vol. VI. Trans. R. S.

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ROYAL SOCIETY OF CANADA

PROCEEDINGS FOR 1903

TWENTY-SECOND GENERAL MEETING

SESSION I. (May 19th.)

The Royal Society held its twenty-second general meeting in the Normal School Building, Elgin Street, Ottawa.

[illegible] signed the roll in the Convocation Hall

ERRATUM.

. 214, line 20 from top, for "32½°, etc.," read "39½°, etc."

President, Sir [illegible]

Acting Honorary Secretary, Dr. S. E. Dawson.

Honorary Treasurer, Dr. James Fletcher.

SECTION I.—Dr. Bellemare, Abbé Bourassa, Hon. Thomas Chapais, L. O. David, Dr. DeCelles, Dr. Fréchette, Dr. Gagnon, Hon. Pascal Poirier, Dr. Poisson, Edouard Richard, Benjamin Sulte.

SECTION II.—Rev. Dr. Bryce, W. Wilfred Campbell, Dr. Dawson, Col. Denison, Wm. Lighthall, Most Rev. Archbishop O'Brien, D. C. Scott.

SECTION III.—C. Baillairgé, Prof. Barnes, Dr. Bovey, Capt. Deville, Prof. Dupuis, Dr. Ellis, Sir Sandford Fleming, Dr. Girdwood, Dr. Glashan, Dr. Hoffmann, Dr. Johnson, T. C. Keefer, President Loudon, Thomas Macfarlane, A. McGill, Prof. McLeod, Frank Shutt, R. F. Stupart.

SECTION IV.—Dr. Adami, Dr. Ami, Rev. Dr. Bethune, Dr. Burgess, Dr. Ells, Dr. Fletcher, Sir James Grant, W. H. Harrington,

MARINE BIOLOGICAL LABORATORY LIBRARY WOODS HOLL, MASS.

ROYAL SOCIETY OF CANADA

PROCEEDINGS FOR 1903

TWENTY-SECOND GENERAL MEETING

SESSION I. (May 19th.)

The Royal Society held its twenty-second general meeting in the Normal School Building, Elgin Street, Ottawa.

The Fellows and Delegates signed the roll in the Convocation Hall at 9.30 a.m.

The President, Sir James Grant, K.C.M.G., took the chair and called the meeting to order at 10 a.m.

The Acting Honorary Secretary called the roll.

The following gentlemen answered to their names or were present later during the meeting:—

List of Fellows Present.

President, Sir James Grant, K.C.M.G.

Acting Honorary Secretary, Dr. S. E. Dawson.

Honorary Treasurer, Dr. James Fletcher.

Section I.—Dr. Bellemare, Abbé Bourassa, Hon. Thomas Chapais, L. O. David, Dr. DeCelles, Dr. Fréchette, Dr. Gagnon, Hon. Pascal Poirier, Dr. Poisson, Edouard Richard, Benjamin Sulte.

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Section IV.—Dr. Adami, Dr. Ami, Rev. Dr. Bethune, Dr. Burgess, Dr. Ells, Dr. Fletcher, Sir James Grant, W. H. Harrington,

Lawrence Lambe, Prof. J. Macoun, Dr. Matthew, Dr. Wesley Mills, Prof. Prince, Dr. Saunders, Dr. Whiteaves.

Letters from absent Fellows, regretting their inability to attend, were received from: —

SECTION I.—Monseigneur Bégin, Dr. Dionne, Abbé Gosselin, Sir J. M. LeMoine.

SECTION II.—Rev. Dr. Burwash, Arthur Harvey, Right Rev. Dr. Howley, Hon. Dr. Longley, W. McLennan, George Murray, Rev. Dr. Murray, John Reade, Rev. Frederick Scott, Dr. Stewart, Rev. Dr. Campbell.

SECTION III.—Prof. Cox, Dr. W. Bell Dawson, Dr. Goodwin, Monsignor Hamel.

SECTION IV.—Dr. Adams, Dr. Bell, Dr. Hay, Dr. MacKay, Prof. Penhallow.

Five newly elected Fellows were introduced and took their seats: Prof. Prince, Dr. Bellemare, Hon. Thomas Chapais, Dr. Gagnon, Dr. Glashan.

The Acting Honorary Secretary then read the

REPORT OF COUNCIL.

The Council of the Royal Society of Canada have the honour to present their twenty-first annual report as follows:—

1. PRINTING OF TRANSACTIONS.

The eighth volume of the second series is now complete and copies are in the hands of members present. Great delay in commencing the work of printing was caused by the long illness of the late Honorary Secretary. Month after month his restoration to health was hoped for and it was only at the last moment that the council took the step of appointing the present secretary to act *pro tempore* until the honorary secretary should recover; or, in case of his death, until the next annual meeting. The appointment was made on October 8th, 1902, under the provisions of Rule XIII. Very few of the papers were in the hands of the secretaries of sections and considerable delay and trouble had to be gone through before they could be got in and sent off to the printers.

The resolution adopted was as follows:

"That in view of the much regretted illness of Sir John Bourinot, Dr. Dawson be appointed temporary honorary secretary; and that he be instructed to go on with the preparation of the next volume of Transactions on the lines adopted by the honorary secretary for the previous volumes."

In accordance with this resolution the volume has been got out and is in your hands.

The volume is an unusually large one. It consists of 164 pages of proceedings and 858 pages of Transactions in the four sections, or 1022 pages in all. There are 164 plates, maps and illustrations of various kinds, so that it will compare favourably with the largest of any of the preceding issues. The space devoted to bibliography adds appreciably to the cost of setting up in type, for such matter is more expensive to set than plain matter. The accounts have been carefully audited by experts and are given in the following financial statement:—

Statement of Balance Carried over at Last Meeting.

1902.			
May 23	—Amount carried over		$ 744 46
June 3	—W. C. Bowles, clerical assistance	$ 50 00	
	Mortimer & Co., illustrations	38 00	
	Taylor & Clark, printing	39 00	
	Gazette Printing Co.	400 00	
	Grip Printing Company	177 46	
	A. Frechette, translation	40 00	
			$ 744 46

Statement, July 1st, 1902, to May 17th, 1903.

Sept.	—Government Grant on account	$3,000 00	
1903.			
Feb. 5	—Government Grant, balance	2,000 00	
			$5,000 00

1902.	*Cr.*	
Oct. 9	—W. C. Bowles, clerical services, balance due	25 00
" 11	—Dominion Express Co.	4 85
" 11	—Grip Engraving Co., illustrations	20 04
" 20	—Manufacturing Stationers Co., binding and distribution	846 19
Nov. 24	—George Bristow, typewriting minutes	2 17
" 24	—Grip Engraving Co., illustrations	67 50
" 24	—Toronto Engraving Co., illustrations	99 45
" 24	—Mortimer & Co., illustrations	52 72
" 28	—Gazette Printing Co., balance of last year's volume	65 05
Dec. 13	—Gazette Printing Co., on account	750 00
		$1,932 97

	Brought forward	$1,932 97	$5,000 00
1903.			
Jan. 10	—Grip Engraving Co., illustrations	206 65	
" 10	—Mortimer & Co., illustrations	33 68	
" 10	—Proof Reading—English	60 00	
" 10	—Proof Reading—French	25 00	
" 10	—S. E. Dawson, to pay express charges and small accounts	5 42	
Feb. 2	—Gazette Printing Co., on account	500 00	
Mar. 9	—Mortimer & Co., illustrations and circulars	19 73	
" 9	—Engrossing diplomas	2 50	
" 9	—Express charges	1 00	
" 9	—C. P. R. Telegraph	65	
" 9	—George Cox, stamping and paper	6 00	
" 9	—Dominion Express Co	1 00	
April 7	—John Robertson, storage of exchanges, etc	36 00	
" 21	—W. C. Bowles, clerical service, current year	60 00	
May 3	—Proof reading, balance in full	60 00	
" 6	—James Hope & Co., stationery	3 78	
" 6	—M. G. Bristow, typewriting	5 54	
" 6	—Manufacturing Stationers Co., Insurance, express, freight on delivery of Vols. 7 and 8	311 05	
" 6	—Gazette Printing Co., on account	800 00	
			4,070 97
	Balance on hand		$ 929 03

2. Early Delivery of Papers.

The society suffers detriment from the lateness of the publication of its Transactions, and that is the result of the late period at which the contributions are sent in. The papers are printed separately for members, and if the separates could be got out early it might suffice. The present volume suffered from the long illness of the late honorary secretary, and it was October 18 before papers began to come in for printing. But the difficulty has always existed, and a stricter observance of the rules is necessary. The regulations provide that the papers shall be sent, in the first instance, to the secretaries of sections who transmit them for printing to the honorary secretary as representing the council.

It was ordered in former years that all papers should be sent in by August 1st. The printing committee was thus in a position to see what was before them and could apportion the amount of illustrations. It is often November or December before any idea can be formed as to the approximate size of the volume, and sometimes members complain if papers are not accepted in January.

This, however, is not so serious as the fact that the delay in getting out the volume prevents many good scientific papers from being sent in. If a paper contains an original contribution to science, or any newly observed fact, the delay in the issue of the volume imperils the claim of priority which authors so highly value. Such papers are most desirable, but they are frequently sent to the scientific magazines where earlier publication can be had. If the separate parts could be got out more quickly their distribution would secure priority, but one paper runs over into a sheet with another and so a number of papers are locked up together, and the slowest man to read his proofs sets the pace for the whole series.

There is little use in making new rules. The rules are sufficient if they are only carried out, and the council urges upon the members the necessity of sending in their papers to the secretaries of their respective sections and of sending them in earlier. The resolution fixing August 1st as the latest date has not been carried out for many years, and the council recommends that August 1st be confirmed as the limit of time for receipt of copy for printing. They ask for the co-operation of every Fellow in this required reform, for it is vital to the usefulness of the Transactions as a record of progress. The council will instruct the honorary secretary to urge this upon the contributors to the new volume.

3. Illustrations.

The number of illustrations is constantly increasing, and must continue to increase with the multiplication of processes for reproducing maps and drawings. But every illustration in a volume like the society's transactions should be original or, if a reproduction of something previously published, it should possess some special quality such as rarity to give it value.

In preparing illustrations reference should also be had to the requirements of the various processes employed. If a photograph or drawing is sent in it should be clear and distinct or it cannot be satisfactorily reproduced. The cost of redrawing subjects from insufficient originals ought not to be thrown upon the society excepting in cases of unusual importance.

4. Copies of Transactions sent to the King.

The distribution of volume 7 was carried out in the usual way, and copies of volumes 6 and 7 handsomely bound were sent, through His Excellency the Governor-General, to the King, and His Majesty was graciously pleased to accept them.

5. Need of a Home.

The society is sadly in need of a fixed home where the volumes of Transactions may be accessible and where its papers may be kept. The exchanges and books from kindred societies now fill fifty-two cases, and are absolutely inaccessible, being stored away in a warehouse on Queen street. The volumes of Transactions are mainly in Montreal. They are in cases and, as a precaution in case of fire, are divided between two warehouses. The number of volumes so stored is given in the statement below. The totals are given. Some are in sheets, some are sewed and some are bound. The volumes in sheets are bound as required. A few volumes on hand are half bound in morocco.

Statement of Volumes on Hand.

	Molson's	Middleton's	Elsewhere
Volume 1—First Series—4to.....	None	None	None
" 2 "	32	25	..
" 3 "	15	25	..
" 4 "	56	13	..
" 5 "	32	48	.
" 6 "	72	5	..
" 7 "	25	30	..
" 8 "	60	60	.
" 9 "	44	28	..
" 10 "	20	40	..
" 11 "	27	30	..
" 12 "	21	30	..
Volume 1—Second Series—8vo..... .	11	17	..
" 2 "	None	None	None
" 3 "	48	25	..
" 4 "	40	32	..
" 5 "	53	..	27
" 6 "	..	53	33
" 7 "	..	..	73

6. Decease of Members.

Once more with the recurring season the council has the melancholy duty of recording the losses which the society has sustained during the preceding year. The honorary secretary, Sir John Bourinot, the Honorable Joseph Royal, Dr. Brymner, Dr. Selwyn and Dr. MacCabe have passed from among us, and their names must now be entered upon the honoured record of brilliant men who have left the imprint of their influence in the records of their country. The names of all deceased members have in this volume been given at the end of the roll; and, as they are read name after name and their life labour rises before the memory, we must feel the high obligation we are under to carry on the work of literature and science in Canada on the lines they have laid down and in a manner worthy of such predecessors.

The loss which the society has suffered by the death of the honorary secretary, Sir John Bourinot, is irreparable. From the organization of the society in 1882 he was its honorary secretary, and the society has had no other. He lived to superintend the publication of nineteen annual volumes of its proceedings and transactions. When the twentieth began to be prepared he was too ill to take a part in it. No one can sufficiently appreciate the attention he gave to the society's business and the interest he took in its work. His zeal was unflagging, and during the long series of years he had served as honorary secretary he had acquired such a knowledge of the society's work that the chief part of its administration had of necessity gravitated to him. He was personally in friendly relations with all the members and his wide acquaintance with all the literary men of Canada was of great assistance to the society. It will be well nigh impossible to find a successor so perfectly suited as Sir John Bourinot for all the duties of honorary secretary. Not only did he serve the society in his official capacity, he enriched its transactions by many monographs of great value. His wide knowledge of all matters connected with the working of constitutional and representative governments is displayed in contributions on the comparative politics of the great self-governing colonies of England, and his learning in political science is manifested in his comparisons of our system with the institutions of other free countries. Such studies as these may be supposed to follow from his position as clerk of the House of Commons; but he was also one of the chief scholars of Canada in all questions of Canadian history. His monograph on Cape Breton is really exhaustive and leaves no room for any one to follow him; and that on the builders of Nova Scotia is a model of painstaking labour and accuracy. No one unfamiliar with the details of the

publication of the Transactions can have any idea of the amount of work he put into his contributions.

His industry was incessant, more so than the requirements of his health permitted. He found time to write a number of volumes which have not only been highly valued in Canada, but are much esteemed abroad. Among them is the history of Canada in the "Story of Nations Series" and a volume on Canada under British rule in the "Cambridge University Series." This was his last published volume, and in many respects it is his best.

The knowledge of parliamentary institutions which accrued from his official position was supplemented by indefatigable study. The result is apparent in the fact that his work on parliamentary procedure is the authority on such questions throughout the Dominion. It is not only conclusively quoted in all the legislatures of Canada, but is quoted as a standard reference in the legislatures of other colonies. On these and kindred subjects he was frequently invited as a lecturer before universities and societies in the United States as well as in Canada; and wherever he went he did credit to his native country and to its rising literature. Many years must pass before his place can be filled. We deplore his loss for the sake of the Royal Society of Canada, and for ourselves, personally, we lament the loss of a friend.

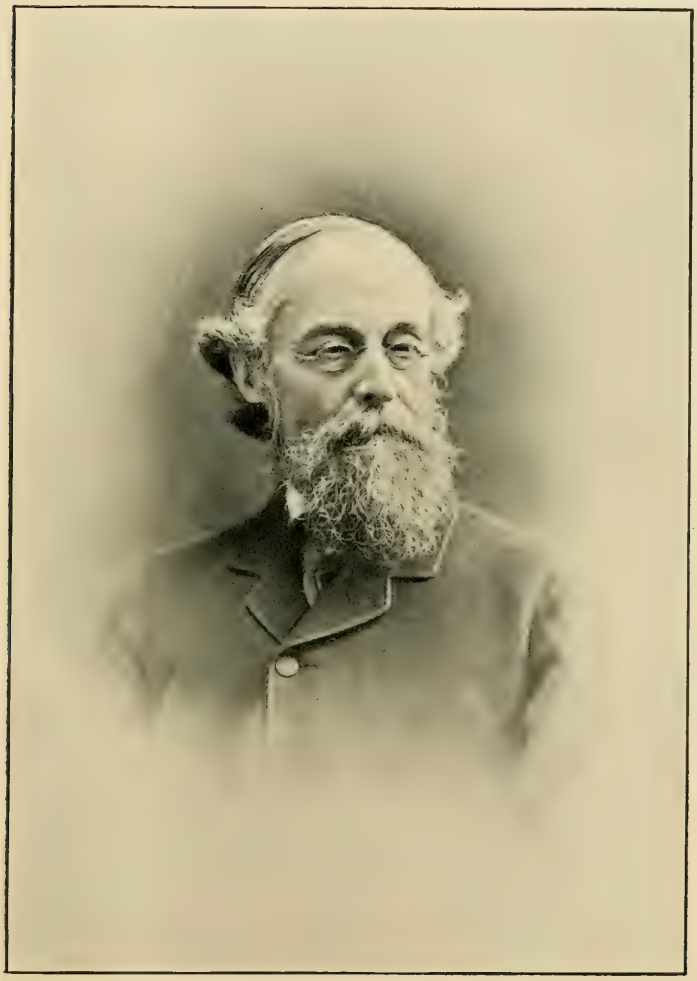
Dr. A. R. C. Selwyn, one of the original Fellows of the Royal Society of Canada, for twenty-five years director of the Geological Survey of Canada, for eighteen years previous director of the Geological Survey of Victoria, Australia, and for seven years previous to that attached to the field staff of the Geological Survey of England and Wales, died in Vancouver, British Columbia, on the 19th of October, 1902, the result of a stroke of paralysis.

At the early age of twenty-one, in 1845, he was appointed to a position on the Geological Survey of Great Britain, under Sir Henry de la Beche. His earliest work on the British Survey was under the immediate supervision of the distinguished geologist, A. C. Ramsay. He was one of that contingent of stratigraphical geologists under Ramsay who did so much to lay down the fundamental lines separating the various formations in that wonderful compendium of geology that England has proved to be.

In 1869 he was called to succeed Sir Wm. Logan as director of the Geological Survey of Canada, which position he held for twenty-five years. He leaves behind him a career full of usefulness to the Empire, for his work was performed not only in Canada, but in the Motherland and in two of her most prosperous colonies.

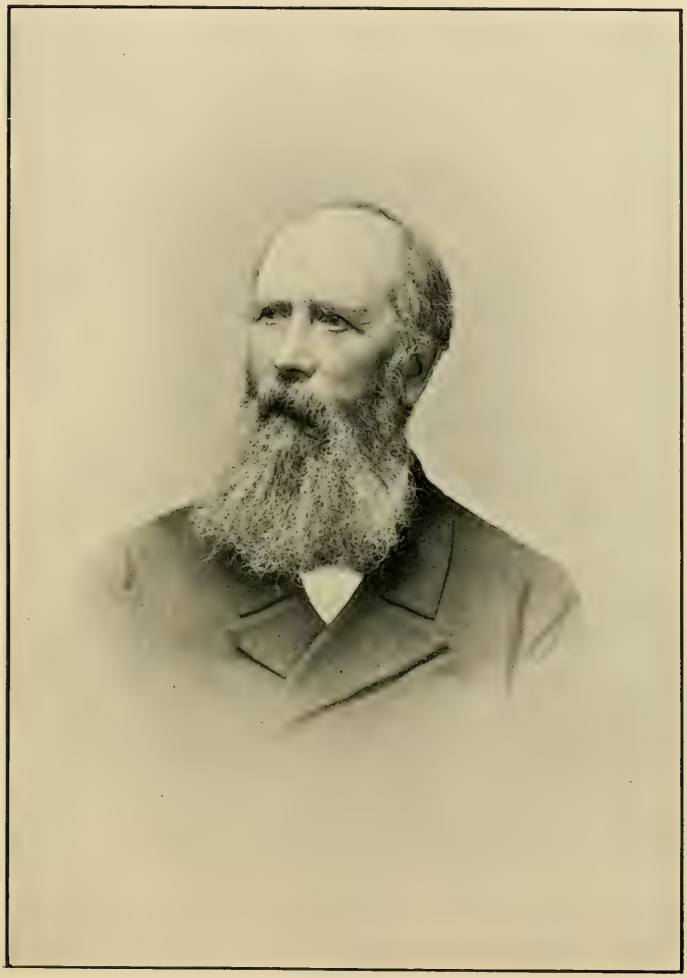
Dr. Selwyn received many honours and occupied numerous distinguished positions, in his capacity as head of the Geological Surveys

SIR J. G. BOURINOT, K.C.M.G., LL.D., ETC.

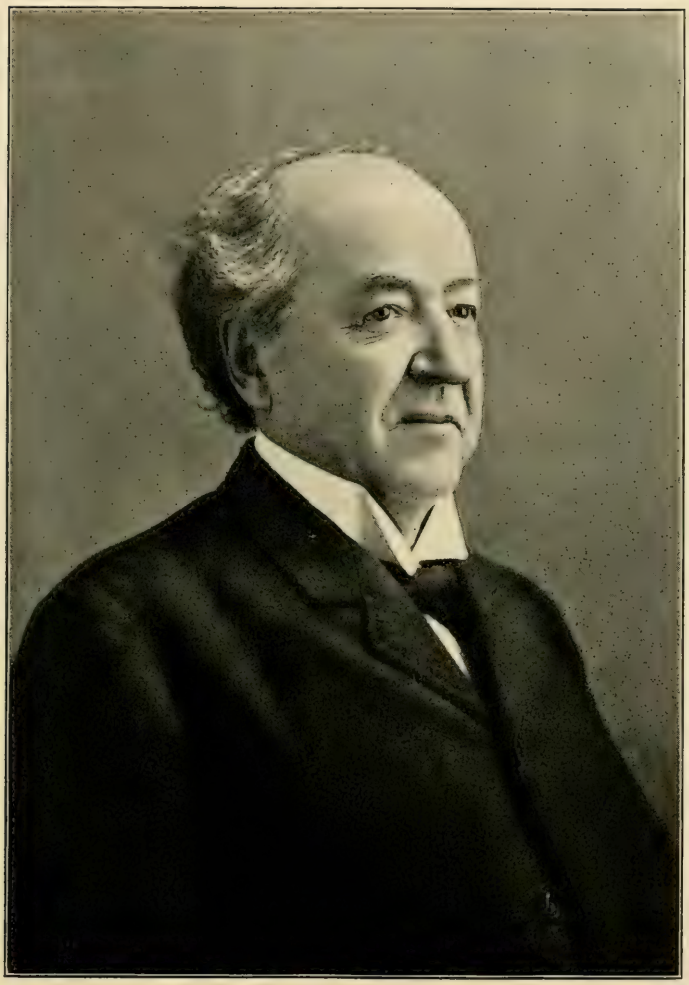


A. R. C. SELWYN, C.M.G., LL.D., ETC.

J. A. MACCABE, LL.D.



DOUGLAS BRYMNER, LL.D.



HON. JOSEPH ROYAL.

of Victoria and Canada. In both countries he emphasized the economic side of the science of geology and did much to encourage those under him to study and solve the complex problems of geological structure which presented themselves to him in his official labours.

In 1877 the council of the Geological Society of London, awarded him the Murchison medal for his eminent services in the field of geology, and, in 1884, he received the Clarke gold medal from the Royal Society of New South Wales. In 1886 he was created a Companion of the Order of St. Michael and St. George.

Since Dr. Selwyn's retirement in December, 1894, he resided in British Columbia.

The name of Dr. Douglas Brymner will ever be associated with the Bureau of Canadian Archives which he organized and, for nearly a third of a century, administered to the satisfaction of the Government and the public. Before he assumed the duties of archivist in 1872, he had been an able and successful journalist. His best work in that capacity was done in collaboration with the late Honourable Edward Goff Penny, senator, in the columns of the Montreal Herald. As editor of the Presbyterian, Dr. Brymner championed, during a critical period of its history, the cause of the Church of Scotland in Canada. He was a contributor to various periodicals, not only in prose but in verse; his translation of some of the Odes of Horace into the Lowland Scottish dialect having been conceded a high merit by good judges. Dr. Brymner was for some years a respected member and for a time president of the Press Gallery at Ottawa. As a journalist he was sincerely esteemed and honoured by his confrères. He was conscientious, patient and fair; and, in style, aimed at clearness and strength rather than brilliancy. For no consideration would he swerve in the slightest degree from his honest convictions, and no man was more painstaking in collecting and sifting the data on which his convictions reposed. Both by character and occupation, therefore, he was admirably fitted for the position of archivist.

Only those who have followed his work year by year, from its inception to its close, can form a just estimate of its value or be aware of its profound and far-reaching significance. In the presidential address (Trans. for 1895), Sir James LeMoine gave an excellent résumé of the contents of the archives reports from 1872 until that year. If we except the special researches of the late Abbé Verreau, of the late Mr. Joseph Marmette and, after Mr. Marmette's death, of Mr. Edouard Richard, the heaviest labours as well as the supervision of the bureau devolved upon Dr. Brymner. How grave and difficult was the responibility imposed upon him by the conditions of his appointment is known to those who can recall the state of our repositories at that

time. The defects which his tour of inspection brought to light would have deterred a less earnest antiquary or a less faithful and energetic public servant from prosecuting the task. But he persevered. Proceeding to Europe, he visited the documentary treasuries of the motherlands and quickly won the confidence of those in charge of them. In the organization of the bureau, therefore, no needed counsel or help was withheld. It was not long till historical inquirers in and out of Canada, recognized the worth of the new source of information. The yearly reports, at first hidden among the appendices to the Agricultural Blue Book, were widely sought, even before they had attained the distinction of separate publication. The correspondence became more and more voluminous, and Dr. Brymner and his assistants tried to meet every fresh demand on their time. Long before Dr. Brymner's death, the archives report, sold at a nominal price, had come to be one of the most popular publications of its kind. It was in as high request in the United States as in Canada, and helped to create a new and fairer school of American historians. If the work of the department in future years can be rendered more effectual it will be cause for felicitation; but it will always remain to the credit of Dr. Douglas Brymner that he laid the foundation on which others must build, and that he set up a standard of official duty of which his own life was the model.

The death of the Honourable Joseph Royal removes from us one of our most able writers. He was not a writer of books but he was in the front rank of French journalism. He was a frequent contributor to *La Revue Canadienne* and assisted at its foundation. He contributed also to other periodicals of high class. His first efforts appeared in *La Minerve* where so many leading lights in journalism commenced their careers. He founded *L'Ordre* in 1858, and, thirty years later, in 1888, he was among the founders of *Le Nouveau Monde.* Later still on the opening up of the West he founded *Le Metis* at St. Boniface in Manitoba.

In Manitoba his influence was great and was always exercised in the direction of peace and moderation. When he went there the fires of insurrection were scarcely cool. His incessant care whether as provincial deputy or minister was always to conciliate strife and remove prejudice. He was a firm believer in the great destiny of the Northwest, for he studied its resources and knew of what he spoke and wrote. In 1890 he became lieutenant-governor of the Northwest Territories and in that high office he served for five years with appreciation and success, for it drew out his genial and conciliating character.

On retiring from office he returned to the province of Quebec and to the profession of journalism. His death was unexpected for his natu-

ral vigour was scarcely touched by age and his many attached friends had expected a long continuation of his useful life. He had completed a History of Canada from 1840 to 1865—from the Union to Confederation. Those who have seen it believe that it will take a high place in Canadian letters.

Dr. MacCabe's death removes from among us one who had during many years been the host of the Royal Society within this building. The society is indebted to him for the facilities for holding its meetings which it has long enjoyed; and for countless courtesies to individual members extending over many years. He was among the foremost of the leaders of education in the province of Ontario. Both in Canada as well as in his native Ireland, his life was devoted to teaching. He was trained in the Normal School of Dublin and from thence he went to the Catholic University. On coming to Nova Scotia in 1869 he was appointed to the Normal School at Truro and on the opening of the present Normal School at Ottawa he was appointed as principal. He was an active participant in many educational and literary associations in the city and by the older members of the Royal Society his hospitable annual welcome will long be remembered.

7. Corresponding Members.

Under No. 8 of the regulations the number of the corresponding members of the society is fixed at a maximum of sixteen. The names of Professor Henry F. Osborn of Columbia University and Professor W. F. Ganong, of Smith University, Northampton, have been submitted and the council would recommend their election.

Professor Osborn is a graduate of Princeton University, New Jersey, where he received the degree of Sc.D. Later he studied abroad at Oxford University and at Heidelberg, returning to occupy the Chair of Zoology at Princeton. For some years, he has been Da Costa Professor of Zoology at Columbia University, New York, and curator of the Department of Vertebrate Palæontology of the American Museum of Natural History, New York, and at present is also chairman of the New York Zoological Society.

Professor W. F. Ganong is a Canadian, born of Loyalist stock at St. John, N.B. He graduated at the University of New Brunswick as B.A. in 1884. Went as student to Harvard University in 1885 and graduated there as A.B. in 1887. He was appointed, first as assistant, and then as instructor in botany. In 1893-4 he studied in Munich and graduated as Ph.D. from the University of Munich in 1894. The same year he was appointed Professor of Botany and Director of the Botanic

Garden of Smith University in Northampton, Mass., where he now resides.

Dr. Ganong has contributed a number of valuable papers to the transactions of the Royal Society of Canada as follows:—

Vol. 5.—" Cartier's First Voyage."

Vol. 7.—"Cartography of the Gulf; Cartier to Champlain.

Vol. 9.—" Site of Fort La Tour."

In the second series he has contributed:—

Vol. 2.—" Place Nomenclature of New Brunswick."

Vol. 3.—"Cartography of New Brunswick."

Vol. 5.—" Historic Sites in New Brunswick."

Vol. 7.—" Evolution of the Boundaries of New Brunswick."

In the present volume is an exhaustive paper on De Monts' and Champlain's settlement on St. Croix Island in the winter of 1604-5, and another paper is announced for the present session which will complete the series of New Brunswick monographs.

Besides the above in Section 2—he contributed in Section IV.—Vol. 8—1st series, a paper on " Southern Vertebrates on the Shores of Acadia."

He has also written " The Teaching Botanist," published by Macmillan, 1899, and " A Laboratory Course in Plant Physiology," published by Holt in 1891.

8. Members of Council.

The time of some of the members having expired, the council, at a meeting on January 23rd, called Mr. T. C. Keefer and Dr. A. D. DeCelles to be members under the provisions of Rule 5.

9. Election of Fellows.

Nomination papers were sent out in regular course on March 15. The forms were in accordance with the rule adopted at last session and the names of three members only as proposers were attached to each nomination.

In Section I. there were two vacancies. The following gentlemen have obtained a majority of the votes of the whole section. There were only two nominations.

Monsignor Pâquet.

Hon. L. A. Prud'homme.

In Section II. there were five nominations but only three vacancies. Mr. W. D. LeSueur has obtained the votes of a majority of the section.

The others did not obtain a majority and the council therefore refers them back to the section for selection and recommendation.

In Section III. there were three nominations for one vacancy and none obtained the requisite number of votes. The names are therefore referred back to the section in like manner.

In Section IV. there were two nominations and only one vacancy, but as neither name obtained the requisite number of votes the council refers the matter back to the section.

10. Associated Societies.

The customary invitations to attend the present meeting and report on the scientific and literary work of the year, were sent to the following Canadian societies, which have hitherto co-operated with the Royal Society:

Society	Place	Delegate
Natural History Society	Montreal	Prof. T. Wesley Mills
Numismatic and Antiquarian Society	do	R. W. McLachlan
Microscopical Society	do	
Société Historique	do	
Société Littéraire de Montréal	do	Rev. J. L. Morin
Literary and Historical Society	Quebec	P. B. Casgrain
Geographical Society	do	
Institut Canadien	do	
Literary and Scientific Society	Ottawa	H. H. Bligh
Field Naturalists' Club	do	W. T. Macoun
Hamilton Scientific Association	Hamilton	Rev. Dr. Marsh
Entomological Society of Ontario	London	Rev. Dr. Bethune
Canadian Institute	Toronto	
Natural History Society of St. John, N.B.	St. John	Hon. Senator Ellis
N. S. Institute of Natural Science	Halifax	Dr. Ells
Historical Society of Nova Scotia	do	Archbishop O'Brien
Natural History Society of B.C	Victoria, B.C	
Wentworth Historical Society	Hamilton, Ont.	
Elgin Historical and Scientific Society	St. Thomas, Ont.	
Historical Society of Manitoba	Winnipeg	Rev. Dr. Bryce
Botanical Club of Canada	Halifax, N.S.	Prof. Macoun
American Folk Lore Society	Montreal	
Historical Society	Kingston	
Royal Astronomical Society	Toronto	R. F. Stupart
Lundy's Lane Historical Society	Niagara Falls	
New Brunswick Historical Society	St. John	
Historical Society of Ontario	Toronto	
Women's Canadian Historical Society of Toronto	do	Mrs. Ahearn
Niagara Historical Society	Niagara	
United Empire Loyalists' Association of Ontario	Hamilton	
Women's Wentworth Historical Society	Hamilton	
Natural History Association	Miramichi	
Peterborough Historical Society	Peterborough	
Canadian Forestry Association	Ottawa	E. Stewart
Women's Canadian Historical Society	do	Mrs. S. E. Dawson
Hamilton Ladies' College Alumnæ Association	Hamilton	
Natural History and Antiquarian Society of P. E. Island	Charlottetown	Lawr'ce W. Watson
Hamilton Astronomical Society	Hamilton	Rev. D. B. Marsh

11. Champlain Ter-centenary.

The council earnestly recommends to the consideration of the society the following letter received from Dr. W. F. Ganong. The event to be celebrated is the first settlement on the Acadian shore 300 years ago, for, although the colony spent only one winter on St. Croix Island it was moved as a body to Port Royal on Annapolis Basin and even the timber of the buildings was removed. The event is no less than the beginning of Canada; for, from that moment, Champlain, the father and founder of Canada, took firm hold of this country and never ceased to hold it until his death. The settlement to be commemorated is also the first settlement by Europeans on this continent north of St. Augustine. It was in 1604, three years before the first permanent settlement at Jamestown in Virginia and sixteen years before the landing of the Pilgrim Fathers at Plymouth. It is a date ever to be remembered in the history of Canada and of North America.

The council recommends that the whole matter be referred to a committee with instructions to report as soon as possible during the present session.

Northampton, Mass., April 27, 1903.

Dr. S. E. Dawson,

Acting Honorary Secretary of the Royal Society of Canada,
Ottawa, Canada.

My dear Dr. Dawson:—

If I understand aright, there is a strong movement in St. John, N.B., towards a fitting celebration in June, 1904, of the three hundredth anniversary of the discovery of the St. John River by de Monts and Champlain, and an important feature hoped for in the celebration is the presence of the Royal Society of Canada. It is most desirable from every point of view, not only that this celebration should be well carried out, but that the Royal Society should honor the city by its presence at that time and I trust both events will be brought to pass. In view of this possibility, I desire to call your attention to one possible feature of such a celebration which ought not to be omitted, namely, a visit to St. Croix—or Dochet—Island, the site of de Monts' settlement, the importance of which in Canadian history it is not necessary here to emphasize. You will recall that de Monts and Champlain on June 24th discovered the mouth of the St. John and two—or possibly three—days later they reached St. Croix Island and established there the settlement whose history is the history of the beginning of the permanent settlement of Canada. It seems to me that a celebration at St. John which omitted a visit to this island would not only be historically incomplete, but would cause those interested to miss one of the greatest attractions such an event could have. The island lies in a region of great natural interest and beauty, is easily reached from St. John, either by special steamer requiring a journey of about four hours each way, or by rail from St. John to St. Stephen or St. Andrews and thence by a charming steamer route of a few miles to the island. There would thus be ample time in one day to make the excursion which naturally should come on the 26th of June, the

probable date of its discovery. Furthermore, since the island, although historically a part of Canada is now politically a part of the United States, it would seem fitting that the Maine Historical Society, which would naturally to some extent be the host on such an occasion, the Royal Society of Canada and the New Brunswick Historical Society, should, if possible, combine in a joint visit to, and fitting ceremonies upon, the island. I am venturing myself, entirely informally, to call the attention of the officers of the Maine Historical Society to the approaching anniversary and the desirability of its celebration upon some such plan, but, of course, a more formal communication between the societies should take place as soon as practicable. It would form a pleasing feature of such a visit of the societies if some permanent memorial appropriate to the place could be left, a bronze tablet upon one of the rock surfaces of the island if nothing more.

In the hope that this matter may seem to you of interest, and that it may be thought worthy of the attention of the Royal Society of Canada,

I am, very truly yours,

WM. F. GANONG.

Since receipt of the preceding letter, the following has been received from the Secretary of the Natural History Society of New Brunswick:

ST. JOHN, N.B., May 11th, 1903.

S. E. DAWSON, Lit. D.,
Acting Honorary Secretary, Royal Society of Canada,
Ottawa.

Dear Sir,

The Natural History Society of New Brunswick extends a cordial invitation to the Royal Society of Canada to hold its session in St. John in June, 1904, on the occasion of the Ter-centenary of the discovery of the Harbour and River St. John by de Monts and Champlain in 1604.

The date is the twenty-fourth of June, and if the Royal Society could arrange to hold its meeting on or about that date instead of in May, it would be more suitable, both on account of the more genial season and in agreement with the time set for the celebration.

We have the honour to remain,

Yours very sincerely,

JOHN V. ELLIS, *President.* G. U. HAY, *Secretary.*

12. BIBLIOGRAPHIES.

The compilation, by the four sections, of Annual Bibliographies of all publications issued during the previous year in their respective departments, has been the subject of many recommendations, and is now in a fair way to be carried out with regularity. Mr. Burpee has contributed an exhaustive bibliography of the English literature of Canada during the year 1901. In such a task it is hard to draw a precise line, and, while the intention was to omit publications in the sciences, it is impossible to avoid overlapping in the case of popular books and articles in which literature and science are inextricably interwoven.

Few can understand the length of time and the amount of patient labour involved in such a work as this.

In science the division of labour, commenced last year, has been carried on. Dr. Whiteaves has continued his Bibliography of Canadian Zoology—excepting Entomology—and the Rev. Dr. Bethune has completed the subject by a continuation of his Bibliography of Entomology. Dr. Ami has continued his work on Canadian publications relating to Geology and Palæontology, and Dr. A. H. MacKay has done the same for Botanical science. The mathematical and physical sciences have not been touched at yet; nor has a commencement been made with the French literature of Canada. The Council hope that the first section will do something to bring annually under general notice the large mass of literature which, year after year, is published in Canada and not known as widely as it deserves.

Even to one familiar with the literary and scientific work carried on in Canada, the amount of such work annually done by Canadians is surprising, when it is seen gathered together and at one view, as in these laborious bibliographies.

13. Preservation of Places of Scenic and Historic Interest.

The Council are glad to present in the Transactions for this year the first fruits of the Committee on this interesting subject, suggested by the Council in 1901. The Honourable Senator Poirier, an Acadian of old French stock, has visited the ruins of the old French fortress of Louisbourg, and written a valuable monograph on the events which one hundred and fifty years ago attracted the attention of all Europe and America to that small point on our Acadian coast. It is a place of supreme historic interest, for there was played the opening act of the Titanic struggle of France and England for the mastery of the American continent. After a century and a half of neglect, the harbour is beginning to resume the importance which it merits, and industrial activity is effacing the scars of old conflicts; but so long as human hearts continue to throb at the recital of deeds of noble daring, so long the memories of the moss grown casemates of old Louisbourg will continue to be cherished.

The Council have also to express their satisfaction at the defeat of the attempt made in Montreal to sweep away the old Chateau de Ramezay. The Legislature of Quebec was too proud of the memories of the French race in Canada to sanction such an act of vandalism as to destroy that witness, standing dumb and yet eloquent, of the deeds and sacrifices of long past years. The Council hopes that it may stand for many future years, so that when our grandchildren ask what means

that quaint old building, they may be told that within its walls the destiny of Canada was fixed, in those far off days of trial, when their forefathers threw in, once for all, their lot with the British Crown and pledged a loyal faith which endures to this day.

14. Time Reckoning.

The completion of the Pacific cable is bringing appreciably nearer the adoption of one system of world time; or universal time referred to one meridian. Such a change is too subversive of all our habits of thought and forms of speech to be adopted, excepting very gradually. A very important step towards simplification, however, was taken by the Intercolonial Railway on its completion in 1876, by introducing the twenty-four hour day. That system was adopted by the Canadian Pacific Railway, from its opening in 1886, for all points west of Lake Superior. It has become familiar to us; for the railways introduced the system into all the provinces of the Dominion, and it has extended to all the great transcontinental lines of this continent.

In the same way five meridians of even hours have displaced the innumerable local times across this continent. That was a most important step and it is now accepted as a matter of course. The transactions of this Society for 1886 contain a paper by Sir Sandford Fleming, setting forth, in detail, the advantages of reckoning by cosmic time and his presidential address in 1890, before the third section, continued to advocate that great change. He had thought it out long previously and had prepared a paper for the meeting of the British Association as early as 1878, but could not obtain a hearing for his proposal; so visionary and utopian did it appear to the officers of that influential scientific body. Change is rapid now, and the world cable brings us face to face with world time. Our thoughts, and of necessity our speech, have been moulded upon the isolation consequent upon distance in space. Rapid transit brought the reduction of all local meridians to five on this continent, but now a merchant in telegraphic communication with Australia, will have to think not only of the time of the day from which his transaction is dating, but of the day itself. Gradually then, but with increasing rapidity, the change will probably come, moving from five meridians to one continental meridian, and at last to one prime meridian, from which all great transactions shall be dated. One such meridian has recently been adopted for that part of South Africa under British influence and, on the 28th of February last, the clocks in the Transvaal were advanced from 11.30 to midnight, to correspond with the meridian of 30 degrees East. That is very nearly the meridian

of Alexandria, the Nile valley and the Equatorial lakes—the meridian of the tides of civilization advancing northwards and southwards through the dark continent; so that we probably shall have in Africa the first instance of a continental meridian and a continental time.

15. Meeting of the International Geological Congress.

The Council has pleasure in announcing that the general secretary of this important association has written to express a wish existing among its leading members to visit the Dominion of Canada and hold, at Ottawa, its triennial meeting in 1906. The Council has received the following letter from Dr. Robert Bell upon the subject :

Geological Survey,
Ottawa, 15th April, 1902.

Dear Dr. Dawson:—

Dr. Diener, the general secretary of the organizing committee of the International Geological Congress, has written me as Acting-Director of the Geological Survey of Canada, that there is a general desire among the geologists of Europe, that Canada should send an invitation to the Congress to hold its next meeting (after the Vienna meeting next August), in Canada. That would be in 1906, the meetings being held every three years.

The geologists who attend the Congress would like to come to this country very much, as it is so interesting geologically and there is so much of it.

On receipt of Dr. Diener's letter, I wrote to Sir Wm. Mulock, Acting Minister of the Interior, and I now enclose you a copy of my letter. He has replied that what the Government has done in previous cases was to grant a bulk sum to be placed in the hands of some organization to be spent for the benefit of the visitors.

After consulting some of my colleagues and Mr. Macfarlane, who attends these meetings, we think the Royal Society of Canada would be the proper organization to take this matter up. As it is too important a subject to spring it upon the Society after they have come to Ottawa, I thought the Council of the Society should be consulted as soon as possible, so that they might consider what steps to take. I therefore write you—as Honorary Secretary—in the meantime, so that you may think it over, and I will take an early opportunity to confer with you about it.

I am sure you will agree with me that Canada should not lose this rare opportunity of inducing this important body of scientific men to visit this country. It would be a pleasure and an honour to us to have them here, and their visit would result in great good to the Dominion. The King of Italy at the first congress, and the Emperor of Russia at the last one, took the greatest personal interest in the meetings and so have the great men of all the countries when the congress have met.

Yours very truly,

Robert Bell.

Dr. S. E. Dawson,
Hon. Secy. Royal Society of Canada,
Ottawa.

The Council warmly recommends the subject to the favourable consideration of the Society and suggests that Dr. Bell's letter, with an enclosure of copy of a letter to the Hon. Sir Wm. Mulock, on the subject be referred to Section IV., with a request to nominate a committee to take such action as will lead to the meeting of the Congress being held at Ottawa.

16. The British World Telegraph Cable.

Every loyal subject of the English Crown must feel intense satisfaction at the successful completion of the Pacific cable from Vancouver Island to Fiji, Australia and New Zealand. With this feeling, which they share in common with all British subjects, the Society must acknowledge some additional pride, inasmuch as a Canadian, and one of their own colleagues, was the originator and moving spirit of the enterprise, and has been continuously identified with its progress until its final success. The design of this great work presented itself to the mind of Mr.—now Sir Sandford—Fleming, when, as engineer-in-chief of the Government Pacific Railway, he was surveying its route across the continent. It was a great idea, carried to completion by patience and perseverance. It was he who supplied the energy, made the calculations, rallied its friends, overcame the hostility of competitors, inspired the necessary diplomacy, initiated and directed the essential surveys, and finally compelled into accord the hesitating Governments of Great Britain and the interested colonies. The result is that the longest of submarine cables is at work, and that Canada is not now at the end of a telegraphic *cul-de-sac*, but on a main line of communication. This is the first ocean cable owned and worked, not by joint stock companies, but by states, and those all British, while the magic band itself touches no foreign soil. It is in reality a thread of nervous life, throbbing round the Empire like the classic morning drumbeat of Britain encircling the world, but outstripping the sun with the speed of thought. We are familiar with the distances across the Atlantic, but the distances across the Pacific are less generally known—they are :—

Vancouver Island to Fanning Island.....	3458	miles.
Fanning Island to Fiji.....	2043	"
Fiji to Norfolk Island.....	981	"
Norfolk Island to Queensland.....	837	"
Norfolk Island to New Zealand.....	519	"
	7838	"

Seven thousand eight hundred and thirty-eight miles owned and worked by the Governments of Great Britain and her greater colonies.

There are few achivements of modern times so great, and few enterprises which have been carried to successful completion against the persistent opposition of such powerful competitors, the smouldering hostility of powerful officials and the steady inertia of powerful Governments.

17. Wireless Telegraphy.

The success of Mr. Marconi's attempts to send signals across the Atlantic Ocean without wires is especially interesting to Canada, because, when he was forbidden to conclude his experiments on the shores of Newfoundland, our Government, not being bound, as was our sister colony, by an unexpired exclusive charter, gave a warm welcome and gracious support to the inventor and projector. It was indeed the first among governments to make a considerable appropriation in aid of what was, at the time, experimental science. The disturbance in space needed to produce effects at a distance must increase with the mileage between transmitting and receiving stations, but the sending of news despatches from America to the London *Times* is a promise of further extension, and we must hope that neither the cost of generating the necessary power nor a confusing effect when frequent wireless messages are crossing each other will interfere with the development of a system so scientifically interesting. The utility of wireless telegraphy in connection with lighthouse service and isolated stations is now fully established, while no steamship on the ocean need ever be out of touch with one or other shore. The value to meteorological science of regular and complete data from the mid-Atlantic, applied to weather predictions for Europe and to storm warnings from America for west-bound vessels, will be high.

While it may, or may not, be true that, in cases of transmission over great distances, improvements are yet required in receiving currents feeble from dispersion, we may hope that all such difficulties will disappear before the advancing march of science.

18. The Transmission and Transformation of Energy.

The wonderful advances of recent years in the transformation and transmission of energy bid fair to place Canada in the front rank of manufacturing countries. The St. Lawrence is a northern river and its valley cuts transversely to the heart of the continent across its axis. Nine-tenths of the water flowing through it comes in from a plateau about one thousand feet above the river level, extending from Labrador to the height of land between Lake Superior and the Lake of the Woods. The millions of horse powers which for

innumerable ages have been flowing to waste, were the theme of the Presidential address of 1899, and every year they become more available by transformation into electrical energy and transmission to indefinite distances for manufacturing purposes. Through the kindness of the citizens of Toronto the Royal Society had at Niagara Falls a grand object lesson. But all along the northern line of the basin of the great river of Canada are hundreds of small Niagaras, sources of wealth which we have hitherto known only as wearisome portages — and the distance of these breaks in navigation is never farther than, even now, is within the limits of easy transmission of power. Such considerations as these, while encouraging and strengthening faith in our country, should warn us to guard jealously against any wasteful deforestation which may tend to impair the even flow of our northern waters. If Providence has held back from central Canada the gift of coal, with which the provinces of the extreme east and west are so richly endowed, there is an incalculable and perennial source of energy at our doors which every advance of science brings closer to us.

19. Triangulation along the 98th Meridian.

This work has been for several years the subject of much interest to the Society, and a committee was appointed to urge upon the Government the importance of continuing the line northward through Canadian territory. A letter from Professor McLeod, at page xiv. of vol. 8 of the Proceedings, explains the matter fully. The subject was taken up again at the Toronto meeting and, at the instance of Section 3, a committee was appointed to press the importance of the matter upon the Government anew. The report of that committee is as follows:

To the Council of the Royal Society of Canada,

Memorandum :

The Committee appointed at the last meeting of the Royal Society for the purpose of ascertaining what action, if any, the Government of Canada is willing to take in the direction of extending the triangulation system of the United States Coast and Geodetic Survey into this country, as urged by the Royal Society in a memorial presented to the Governor-General-in-Council in the year 1898, and to again urge the importance of the work, have the honour to submit the following report:

In December, 1898, the Royal Society brought to the attention of His Excellency the Governor-General-in-Council a proposal by Dr. Pritchett, at the time Superintendent of the United States Coast and Geodetic Survey, to measure an arc along the 98th meridian from Acapulco, Mexico, to the shore of the Arctic sea in Canada. The measurement of the meridian had been in progress for some time as part of the general survey of the United States ; the object of Dr. Pritchett in urging its extension through Canada

and Mexico was to provide data for the determination of the figure and dimensions of the earth, and while from this point of view the work would be purely scientific, the Canadian portion of it would also be of great practical utility in forming the basis of a thorough geographical survey for the Dominion. The Government of Mexico had announced its readiness to undertake its part of the work; the successful execution of the project as a whole therefore, depended entirely on the co-operation of Canada. It was suggested by the Royal Society that a limited grant for this purpose would be regarded as a contribution to aid in the general researches of the nations of the world, while at the same time it would serve to inaugurate a very much needed work, and one of great practical importance to the future of the Dominion.

The answer of the Government was that while they fully appreciated the importance of the project from a scientific and practical point of view, they were not in a position then to recommend the co-operation of Canada in the suggested work.

During the five years elapsed since this memorial was presented to His Excellency the Governor-General-in-Council, the work has been more than half completed in the United States and the cost has been reduced to little more than $50 per mile of progress along the axis of the triangulation, this very low figure being due to exceptionally favourable circumstances and furnishing a probable lower limit of cost. In Mexico, the work has been pushed rapidly forward by the Mexican Geodetic Commission. The most difficult part of the triangulation, across the two main chains of the Grand Cordillera, has been completed and connected with the National Observatory at Tacubaya. A preliminary survey for locating the triangles has been made as far as Acapulco on the Pacific Coast, towards the south, and Tampico, on the Gulf of Mexico, towards the north. Director Angel Anguiano, under whose skilled guidance the work is being executed, expects to finish the triangulation from Acapulco to Tampico in little more than a year, leaving only a short interval from Tampico to a point near Matamoros for completing the whole of the work in Mexico.

While considering the advisability of again bringing this matter before the Government, it has occurred to your Committee that the time has arrived when the larger question of a Geodetic Survey as a basis for systematic surveys in Canada, should receive earnest consideration. In your memorial of 1898, it was represented that without such a basis, there is no finality in results; the same ground is being surveyed over and over again, as is the case in the Dominion, by the land surveyor, the geologist, the railway or canal engineer, the hydrographer, etc. For every new object a new survey has to be made. The labour and expenditure on these surveys would be considerably reduced and often entirely unnecessary, if we had a systematic triangulation carried out as in other countries.

This fact has long been recognized in Europe, where every country has been accurately mapped. Outside of Europe may be cited the United States, whose triangulation is well advanced; India which offers a striking instance of extensive and well conducted surveys, the Cape of Good Hope and Natal, which have executed a joint triangulation of South Africa ; New Zealand, where triangulation has preceded all other surveys. It must not be supposed that there were no objections raised in these countries to the inception of the work; on the contrary, it was frequently opposed by those who did not understand its practical value, but their opinions changed after

they had been in a position to appreciate its usefulness. Of the Survey of South Africa, Mr. David Gill, Her Majesty's Astronomer at the Cape, says : —

"The influence of the Geodetic Survey has made itself felt by raising "the whole tone of survey operations in South Africa. Strongly as it was "at first opposed and grudgingly as it was maintained, its advantages are "now fully acknowledged, and by none more warmly than the Surveyor-"Generals of the Cape Colony, Natal and Bechuanaland."

There are few countries, if any, where the expenditure for surveys per capita of population is as large as it is in Canada. The Department of the Interior is subdividing lands in Manitoba, the Northwest Territories and British Columbia, the Geological Survey Department is surveying and exploring in all parts of the Dominion, the Department of Marine and Fisheries is making a hydrographic survey of our navigable waters, a military survey of the country is in course of execution under the direction of the military authorities, the Department of Public Works and the Department of Railways and Canals are also conducting extensive surveys. In these operations, ground already covered by one department is often gone over again by some other department. The same distribution and duplication of work is repeated in each province, where almost every department of the Local Government and many of the great corporations are making surveys for some purpose or another. Were this great mass of information bound and connected together by a triangulation it would become possible to take a broad and comprehensive view of great questions affecting the country instead of considering them only under the few aspects presented by local surveys. That the practical value of accurate maps is not overestimated by your Committee is shown by the experience of the British army in South Africa; millions in money and many valuable lives would probably have been saved, had accurate maps of the country been available. One of the first acts of the British Government after the war, and even while it was going on, was to commence an elaborate survey of the country.

The Dominion of Canada, controlling an area surpassed only by that of Russia, but of which the greater portion is still unsurveyed, would be distinctly benefited by a triangulation as a means for the extension of further surveys. The explorations incidental to the establishment of the triangles would afford an opportunity of collecting information for which any special demand may arise, such as the height of waterfalls and the volume of water, for determining their commercial value.

While thus advocating a rational basis for the surveys made in Canada, your Committee is not blind to the fact that owing to the immense extent of the country and its sparse population, the question presents peculiar difficulties. Were it proposed to organize a Geodetic Survey on the same lines as in the small, thickly populated European states, the cost would probably be beyond the resources of Canada and the Government might well hesitate before undertaking a project of such magnitude. It is believed, however, that a scheme may be devised which, while within the means of Canada, will give to the country, or at least to its most populated parts, the benefits of a Geodetic Survey. For this purpose, it is respectfully recommended that the Government be asked to appoint a Commission to collect information, and to enquire and report upon the subject. With the material furnished

by the Commission, the Government will be in a position to decide what is required in the interests of the country and for the development of its resources.

Respectfully submitted,

C. H. McLeod,
Henry T. Bovey,
Sandford Fleming,
E. Deville.
Thos. C. Keefer,

April 13, 1903.

20. Marine and Lake Biological Stations.

As will appear on page xli. of last year's Proceedings, the Society passed a resolution upon this subject and ordered that a copy be sent to every member of the Government and of Parliament. The Acting Honorary Secretary prepared a letter embodying the resolution and sent it out to the persons indicated. A number of acknowledgments have been received.

In their report for 1895 the Council while transmitting a letter from Professor Knight, of Queen's University, invited the special attention of the Royal Society to the importance of instituting a zoological laboratory at some place on the lakes or upon the seashore of the Dominion. The Government established a marine laboratory on the seashore in 1899 and its success has been recorded in the reports of Council every year since then. The Council has now the pleasure of announcing that a similar laboratory was instituted in 1901 on the lakes under the supervision of the Dominion Commissioner of Fisheries, but under the immediate direction of Dr. B. Arthur Bensley. The management is entrusted to a committee of members of the scientific faculties of the University of Toronto and the Council is indebted to Dr. Bensley and the Rev. Dr. Burwash, the chairman of the committee, for a report upon its progress.

(A report on the Atlantic Station from Professor Prince will be found in Appendix B. together with the above on Lake Huron).

21. Tidal Survey.

A full report of this service, by Dr. W. Bell Dawson, is given as Appendix C.

22. Ethnological Survey.

It will be seen on reference to pp. xiv. and xl. of last year's Proceedings that a Committee was appointed to initiate an Ethnological Survey of Canada on lines corresponding to those adopted in the United Kingdom and to continue similar work which had been

carried on since 1884 regarding the Northwestern Indians by a committee of which the late Dr. George Dawson was chairman.

As the nature of this work is set forth at length in the above indicated pages, the Council need not go over it again. The Committee has made the following report:—

Report of Committee.

In accordance with resolutions passed at the Toronto meeting of the Royal Society in 1902, the Committee has taken measures to enlist the co-operation of the various provincial governments who are asked to contribute as follows :—

Dominion	$5,000
Ontario	4,000
Quebec	3,000
New Brunswick	2,000
Nova Scotia	2,000
Manitoba	2,000
British Columbia	2,000
Prince Edward Island	1,000

A memorial has been prepared and forwarded to representatives in the various provinces for presentation to the Premiers. Financial stringency has operated in two or three cases to delay favourable responses, but the Committee is prepared to vigorously urge their claims at the first favourable opportunity. The Memorial is as follows :—

Sir :—

We have the honour to present for your consideration and that of your colleagues, the members of the Cabinet, the following report and resolution presented at and adopted by the Royal Society of Canada at its meeting held at Toronto on the 27th of May, respecting the urgent need of some systematic investigation of the Ethnology of this country, and on behalf of the Committee of the Royal Society of Canada, we would also venture to urge upon the Dominion Government and upon the various provincial governments, the enactment of such legislation as may be necessary to give force to the suggestions herein set forth.

At the meeting of the Royal Society of Canada, held at Toronto on the 27th of May, the Council made the following report :—

(So far as this report may be found at page xiv. of the Proceedings of last year it is not repeated here. The present memorial then goes on to say :—)

In view of the presentation thus made by Council, the Royal Society then unanimously adopted the following resolution :—

That "Hon. J. W. Longley, Sir James Grant, M.D., Dr. T. W. Burgess, Prof. John Campbell, Dr. George Bryce, Mr. W. Wilfred Campbell, and Prof.

D. P. Penhallow as Chairman, be appointed as a Standing Committee of the Society to co-operate with the British Association Committee on an Ethnological Survey of Canada, and that they be empowered to take such steps as may be necessary to secure from the various provincial governments, as also from the Dominion Government, the adoption of legislation relative to the establishment of Provincial Museums of Ethnology and the organization of a permanent Ethnological Survey of the entire Dominion."

In order to give force to the resolutions thus adopted by the Royal Society of Canada, and to provide that the work of investigation may proceed with as little delay as possible, we would respectfully urge upon your Government the adoption of such measures as may be necessary to establish a Provincial Museum of Ethnology; to appropriate the sum of annually for the prosecution of Ethnological research within the limits of your province; to appoint a suitable representative to act as a member of the Central Committee, who may or may not be a member of the present Committee of the Royal Society, and to empower the Central Committee to act on behalf of your Government with respect to: 1st, the direction and control of all matters relating to the scientific investigation of the Provincial Ethnology; 2nd, the proper expenditure of such funds as may be voted for that purpose, and 3rd, a general oversight of the formation of museum collections under the special direction of such curator as may be appointed. If these conditions are fulfilled, the Committee would conduct the Ethnological work on the following lines: —

1. A complete survey of each province would be made with respect to
   (*a*) The aboriginal or Indian population.
   (*b*) The white population.

2. The work of the Committee will involve the collection of data respecting:
   (*a*) Vital statistics, and statistics relating to movements and extent of population.
   (*b*) Physical types of the inhabitants.
   (*c*) Current traditions and beliefs.
   (*d*) Peculiarities of dialect.
   (*e*) Monuments and other remains of ancient culture.
   (*f*) Historical evidences of continuity of race.

3. All Ethnological material will be deposited in the first instance in the museum of the province from which obtained. Duplicate material will be used for purposes of exchange, and also deposited in the British Museum or such other place as may be selected.

In conclusion, we would respectfully refer to the very great energy with which the ethnology of Canada has been exploited for many years, under the direction of the Smithsonian Institution at Washington, and the American Museum of Natural History at New York. While wishing to accord all credit for the admirable and thorough way in which this work has been done, and to acknowledge the benefit which it must be to Canada, we nevertheless feel strongly that such work should be initiated by ourselves and that whatever ethnological material of value may be derivable from our

aboriginal people, should find a permanent place in our own museums, rather than in those of a foreign country.

We therefore earnestly pray our petition may be granted, and ever remain,

Your obedient servants,

D. P. PENHALLOW,
Chairman.
J. W. LONGLEY,
JAMES GRANT, M.D., K.C.M.G.
T. J. W. BURGESS, M.D.
JOHN CAMPBELL.
GEORGE BRYCE.
W. WILFRED CAMPBELL.

It will be for the Society to take such further steps as may seem advisable.

23. ARCHIVES.

The office of Archivist, vacant by the death of the late Dr. Brymner, has not yet been filled and the report for the year 1902 has not yet been published. Mr. Edouard Richard, who has been in France for five years, making researches, has returned and is preparing for publication the results of his labours. Continuing the detailed report of 1899, he has analyzed the documents he indicated in that report as to be found in the Ministère des Colonies, to which department all the documents formerly in the Archives de la Marine have been removed. Only a few volumes relating to Cavelier de La Salle and the posts on the Illinois remain to be analyzed.

He found in the Archives Nationales and the Dépot des Cartes et Plans in the Rue de l'Université, a rich collection of documents unexplored and almost untouched. He was not able to obtain permission from the French authorities to analyze, still less, to transcribe anything there. There are unsettled questions of diplomacy, rendering it unadvisable to open up these Archives for the present; but it may yet be possible, without throwing open these Archives to strangers, to obtain through the services of officers of the French Civil Service, copies of many of the documents. Meanwhile, Mr. Richard is preparing for the press the results of his labours. They will require two volumes of about 500 pages each.

24. FORESTRY.

In the very first volume of the Transactions of this Society is a paper read, in 1882, by Dr. William Saunders, upon the value of our forests and the imperative need of taking immediate steps to prevent

the deforesting of the country. Since then the Society has always kept the subject in view. In the last volume of the first series, is a paper read by Professor Macoun upon the same subject. In the first volume of the present series, is an earnest appeal from Section IV; and from time to time, resolutions have been passed and lectures have been delivered before the Society, urging the question upon the attention of Government.

Since 1882, the wood-pulp industry has developed with astonishing rapidity, and the manufacture has advanced into the front rank of industries essential to civilization. The sub-arctic forests of the northern regions, formerly considered valueless, have in consequence assumed importance, and many waste and rocky places, unsuited for agriculture, are beginning to take on a hitherto unsuspected value, by their suitability for successive growths of pulp-wood. It is fortunate for the Dominion, that the trees best adapted for this great industry, are the spruces and poplars of the northern forests. The possibilities of the development of this new and promising business are only now beginning to be evident. It is a promise of wealth from regions hitherto supposed to be valueless.

The Council has great satisfaction in following the work carried on in the Northwest by the Superintendent of Forestry, a branch of the Department of the Interior inaugurated three years ago. The reports of this officer and his subordinates appear in the annual report of that department. A million and a quarter trees were this spring available at the different Experimental Farm stations for transplanting upon the plains; and the notices of the fire-rangers are not confined to the limits of ordinary travel, but are posted all along the valley of the Peace River and far down the valley of the Mackenzie River. So far, then, as the influence of the Dominion Government extends, strenuous efforts are being made to extend tree-planting upon the plains. How to check or prevent forest fires is an exceedingly difficult problem, but the Dominion and some of the Provincial Governments are alive to its importance. The whole subject has, within only a few years, sprung into the first rank of questions of public interest. The Canadian Forestry Association is doing most useful work by its intelligent scientific discussions and, as its membership extends over the whole Dominion, we may hope for great benefit to the country from its earnest efforts. Few questions are so important to the welfare of Canada.

25. Science Applied to Increasing Production.

The application of scientific principles and methods to agriculture proceeds steadily from year to year broadening its field of action. The work of the experimental farms increases in scientific interest and

practical value. The reports of its trained officers have been before us for many years, but familiarity should not blind us to the long and patient antecedent researches, the practical results of which alone we are apt to recognize. In addition, we have now in the Dairy Commission, a movable agricultural college bringing home to our producers, by object lessons, model factories and lectures, the most approved methods and submitting them to actual working practice before their eyes. In this way, and by inquiring into the conditions and requirements of distant markets and teaching our farmers to adapt themselves thereto, the value of our agricultural exports has increased to a surprising degree in the last few years. These results are not the less scientific because they are practical, and if in eight years the export of butter from the port of Montreal increased sixteen fold, the improved processes of production and transportation which caused so rapid a growth, were applications of scientific principles patiently investigated and carefully applied.

A movement has been inaugurated and is gathering strength to introduce into rural schools, a knowledge of these principles. It is a promising and praiseworthy effort, for it will tend to enliven with a new interest, the monotony of rural life and help to counterbalance the attractions which are drawing the youth into the cities.

26. Committee on Geological Nomenclature.

Referring to pages xxxix and xli of last year's Proceedings, it will be seen that the Committee on this subject was continued. A provisional report was then sent in and appears in the Proceedings. In continuing the Committee, power was given to add to their number. The Council has reason to believe that progress is being made, but no further report has been made.

27. Geographic Nomenclature.

The commission on Geographical Nomenclature appointed by the Dominion Government three years ago continues its useful work. In the Northwest its functions are most important in settling the many new place-names which are incessantly being added to the map.

Most of these names are from the Indian languages. They were given by the Indians because of some marked physical feature which attracted their observant eyes. Indians are born geographers and the Commission is doing good service in preserving their significant names and fixing them on the map in intelligible orthography.

28. International Congress of Americanists.

The meeting of this body was held in New York last October and, as its objects are specially within the scope of Sections I. and II. Section I. nominated MM. J. Edmond Roy and Léon Gérin and the society appointed them delegates to attend as representatives of the Royal Society in response to an invitation received. Mr. Gérin was, to his great regret, unable to attend. The council has been informed that Mr. Roy was present, but he has been absent in Europe for several months and no report has reached the council as yet.

29. Map of Canada.

The Council are glad to be able to report that the need of an accurate general map of the Dominion, pointed out in their Report of 1898, has been supplied. The Department of the Interior has issued, during the past year, such a map. It is engraved on copper in the best style and the work has been completely done in Canada.

It was moved by Dr. Alex. Johnson, seconded by Thomas Macfarlane, and carried:

That the report of Council just read be adopted.

It was moved by Professor E. E. Prince, seconded by R. F. Stupart, and carried:

That the minutes and proceedings of the general meeting of 1902, as printed in Volume VIII. of the Proceedings and Transactions, be approved and confirmed.

Moved by Dr. Wesley Mills, seconded by Senator Poirier and resolved:—

That the suggestion of Mr. Wilfred Campbell in regard to the report of the Council be referred to the sections for consideration and report at this meeting of the Council.

The meeting adjourned at 12 o'clock, and the sections proceeded to organize in their respective rooms.

AFTERNOON SESSION. (May 19th.)

The Society re-assembled at 2.30 p.m.

The following newly elected Fellows were introduced and took their seats: W. D. Lighthall, Dr. W. D. LeSueur, Dr. Adami.

It was moved by Rev. Dr. Bryce, seconded by D. C. Scott:

That the following be a committee to consider the question of a fitting commemoration of the three hundredth anniversary of the settlement of Champlain and De Monts on the coast of Acadia in

1604; together with the advisability of holding the next annual session of the Society at St. John, New Brunswick, or other place. The Committee to report as early as possible at the present session.

Hon. Senator Poirier, Mr. B. Sulte, Sir Sandford Fleming, Dr. G. Matthew, Hon. Thomas Chapais.

The following resolutions were then passed: —

Moved by Sir Sandford Fleming, seconded by Thomas Macfarlane, and carried:

That in accordance with the recommendation of the Council, Dr. Henry Fairfield Osborn be elected a corresponding member of the Society.

Moved by Thomas Macfarlane, seconded by Sir Sandford Fleming, and carried:

That Dr. W. F. Ganong be elected a corresponding member of the Society in accordance with the recommendation of the Council.

Capt. Deville presented the following report from Section III.:

OTTAWA, 19th May, 1903.

Section III. has the honour to report that they have considered the election of a new member referred to them by Council and they recommend the election of Dr. J. C. McLennan, of Toronto University.

E. DEVILLE,
Secretary.

Whereupon it was moved by Capt. Deville, seconded by Dr. Johnson, and carried:

That Rule 6 be suspended, that the report of Section III., just read, be adopted and that Dr. J. C. McLennan be elected a member of the Society.

Delegates from Associated Societies were then called upon for their reports. The following were read: (N.B.—The reports of these Societies are printed together in Appendix D.)

The Natural History Society of Montreal, by Prof. T. Wesley Mills.

Société Littéraire de Montréal, par Rev. J. L. Morin.

Ottawa Literary and Scientific Society, by Harris H. Bligh, President.

Nova Scotia Historical Society, read by Archbishop O'Brien in the absence of Hon. J. W. Longley.

Women's Canadian Historical Society of Toronto, by Mrs. T. Ahearn.

Women's Canadian Historical Society of Ottawa, by Mrs. S. E. Dawson.

Natural History Society of New Brunswick, by Hon. Senator Ellis.

The following report from Section IV. was then presented:

That the members of Section IV. of the Royal Society cordially approve of the proposal embodied in the report of the Council to invite the International Geological Congress to hold their tenth meeting in Canada and recommend the appointment of the following Committee; with power to add to their number, to issue the invitation, wait on the Government regarding financial assistance and, generally, to make all the necessary arrangements for the proposed visit:

Sir James Grant, Archbishop O'Brien, Sir Sandford Fleming, Col. G. T. Denison, Abbé Laflamme, Professor C. H. McLeod, Robert Bell, Hon. Mr. Longley, R. W. Ells, Mr. Poole, Prof. Adams, T. Macfarlane, Prof. Coleman, G. W. Taylor, J. F. Whiteaves, W. Saunders, A. H. MacKay, J. W. Bailey, G. F. Matthew, Hon. G. W. Ross, J. Willison, Dr. Fréchette, Prof. Goodwin, Prof. Bryce, Dr. S. E. Dawson, Monseigneur Bégin, President Loudon.

Whereupon it was moved by Thomas Macfarlane, seconded by Dr. R. W. Ells, and carried:

That the report of Section IV. on the proposed invitation to the International Geological Congress be approved, and the Committee named for making all the necessary arrangements appointed as follows: —

Sir James Grant, Archbishop O'Brien, Sir Sandford Fleming, Col. G. T. Denison, Abbé Laflamme, Prof. C. H. McLeod, Hon. Mr. Longley, Mr. Poole, Prof. Adams, Prof. Coleman, President Loudon.

The Secretary, Mr. Lawrence M. Lambe, reported from Section IV. as follows: —

Section IV. begs further to report the election of Dr. A. E. Barlow, of the Geological Survey of Canada, as a member of this Society to a vacancy in Section IV.

At 3.15 p.m the Fellows adjourned to their respective sections.

At 4.30 p.m. the Fellows and Delegates attended a garden party at the Central Experimental Farm, given by Mrs. Saunders in honour of the Royal Society.

EVENING SESSION. (May 19th.)

The President, Sir James Grant, K.C.M.G., delivered his presidential address at 8 p.m. in the Convocation Hall of the Normal School, subject: Brain Power and how to preserve it. The address was illustrated by a number of lime light lantern slides.

For address, see Appendix A.

SESSION II.

Wednesday, (May 20.)

The Society reassembled at 10 a.m. and the reading of the reports of Associated Societies was resumed.

Royal Astronomical Society of Toronto, by R. F. Stupart.

Numismatic and Antiquarian Society of Montreal, by R. W. McLachlan.

Hamilton Scientific Association, by Rev. D. B. Marsh.

Historical Society of Manitoba, by Rev. Dr. Bryce.

Entomological Society of Ontario, by Rev. Dr. Bethune.

It was moved by Dr. Fletcher, seconded by Prof. Macoun, and carried :—

That the recommendation of Section IV. be adopted, and that Dr. Barlow be elected a Fellow of the Society.

The following reports of Associated Societies were presented:—

Literary and Historical Society of Quebec.

Lundy's Lane Historical Society.

United Empire Loyalists' Association of Ontario—Hamilton Branch.

Ontario Historical Society.

Miramichi Natural History Association.

Elgin Historical and Scientific Institute, St. Thomas.

Nova Scotia Institute of Science.

New Brunswick Historical Society

Moved by Thomas Macfarlane, seconded by Abbé Bourassa, and carried:—

That the subject referred to in the report of the Numismatic and Antiquarian Society of Montreal, and the remarks of Mr. Lighthall regarding the preservation of Canadian historical monuments be referred to Sections I. and II. of the Society, for such resolutions and action they see fit to recommend that the Society should adopt.

Dr. James Fletcher then made a verbal report of the work done during the past year by the Field Naturalists' Club of Ottawa.

The following telegram was handed in by the Hon. J. V. Ellis and, after being read to the Society, was referred to the Committee on the Champlain celebration:—

St. John, N.B., May 19th, 1903.

Senator J. V. Ellis, Ottawa.

President Howe and Executive Historical Society desire you to represent that body in Royal Society. They join in invitation Royal Society to meet here next year. S. D. Scott,

The Committee on the nomination of officers was appointed as follows:—

Moved by Dr. Girdwood, seconded by Dr. Saunders, and carried:—

That the following be a Committee for the nomination of officers for the ensuing year: Sir James Grant, Sir Sandford Fleming, Hon. Pascal Poirier, Dr. Burgess, Rev. Dr. Bryce, Archbishop O'Brien.

It was moved by Prof. C. H. McLeod, seconded by Capt. Deville, and carried:—

Resolved—In accordance with the recommendation of the special Committee appointed to report on the proposal to extend the triangulation of the United States Coast and Geodetic Survey into Canada, that a Geodetic Commission should be appointed by the Government of Canada to consider the whole question of a triangulation survey for Canada, and that a deputation consisting of Sir James Grant, Sir Sandford Fleming, President Loudon, Mr. Keefer, Dr. A. Johnson. Prof. McLeod, with power to add to their number, be appointed to wait upon the Government with a view of urging the suggestion of the Committee.

The President announced that the Premier, the Right Honourable Sir Wilfrid Laurier, had consented to receive, at one o'clock, the Committee of the Society upon the proposed visit to Canada of the International Geological Congress.

AFTERNOON SESSION. (May 20th.)

The Society reassembled at 2.30 p.m.

The President reported verbally the result of the interview with the Premier, which was generally to the effect that further information was desirable before any definite reply could be given, and that he would be glad if the Society would make more detailed representation.

The President read the following telegrams and, the approval of the Society having been given, he despatched them by cable:—

To His Gracious Majesty,
The King.

The members of the Royal Society of Canada, assembled at their 22nd Annual Session, desire to tender their warmest congratulations on your restoration to health, and that your Most Gracious Majesty has been crowned and anointed King, over a united and prosperous Empire.

J. A. Grant,
President.

To the Secretary,
His Majesty's Household.

To the Duke of Argyll.

The members of the Royal Society of Canada, assembled at their 22nd session, desire to tender you their warmest thanks, as founder of this Society, which has contributed greatly to forward the scientific and literary interests of this Dominion.

J. A. Grant,
President.

Mr. E. Stewart, Dominion Superintendent of Forestry, addressed the Society and made a verbal report from the Canadian Forestry Association.

The following letter from the Mayor of St. John, N.B., was handed in by Hon. Senator Ellis and referred to the Committee on the proposed Champlain celebration:—

Mayor's Office, St. John, N.B.,
18th May, 1903.

Hon. John V. Ellis,
President Natural History Society.

Dear Mr. Ellis:—

I understand that the Natural History Society is moving to get the Royal Society of Canada to meet in our city in late June, so as to hold its annual session here at the date of the ter-centenary of the discovery of Saint John river and harbour by Champlain.

As Mayor of Saint John, I may assure you that all our citizens will be very glad, if the purpose which the Natural History Society has in view, can be accomplished, and that the Royal Society of Canada will be heartily welcomed to St. John by all classes in our community, at the date indicated, or at any other time they may be pleased to come.

I am,
Yours truly,
Walter W. White,
Mayor.

The meeting then adjourned until the following morning at 10 o'clock.

From 5 until 7 p.m., Lady Grant held a reception for the Fellows and Delegates.

EVENING SESSION. (May 20th.)

Professor T. Wesley Mills delivered a lecture at 8 o'clock, in the Convocation Hall of the Normal School. Subject "A chapter in the Physiology and Psychology of Music." Musical illustrations were

given by Dr. T. Gibson and Mr. D. Heins, and a number of explanatory lime light slides were shown.

After the lecture an "At Home" of the resident Fellows was held in the Normal School Building.

SESSION III. (May 21st.)

The Royal Society assembled at 10 a.m

The following telegram was read and referred to the Committee upon the proposed Champlain celebration:—

St. John, N.B., May 20th, 1903.

The President of the Royal Society of Canada,
Ottawa.

The New Brunswick Loyalists Society cordially invites the Royal Society of Canada to hold annual meeting for 1904 at St. John. Would suggest that if practicable date of meeting be arranged to include May 18th, the one hundred and twenty-first anniversary of landing of Loyalists or June 24th, ter-centenary of discovery River St. John.

D. R. Jack (Historian)
for Officers and Members of New Brunswick Loyalists Society.

The following reply from the Duke of Argyll was also read:—

Inveraray, May 21st, 1903.

Congratulations and thanks. Sympathy for sufferers by fire.

Argyll.

The reply from His Majesty the King was received after the meeting closed and is as follows:—

London, May 25th, 1903.

President Royal Society of Canada,

I have the honour of submitting your telegram to the King and I am commanded by His Majesty to express his warm thanks to the members of the Society for their loyal congratulations.

Knollys.

The Nominating Committee brought in the following report:—

The Committee beg to recommend the following gentlemen to be officers for the year 1903-4 :—

President—Lt.-Col. G. T. Denison, B.C.L.
Vice-President—Benjamin Sulte.
Honorary Secretary—Dr. S. E. Dawson.
Honorary Treasurer—Dr. James Fletcher.

The President put the names separately to the meeting. The report was adopted unanimously and he declared the above gentlemen elected.

Mr. W. D. Lighthall from the Committee upon Historical Monuments and Sites read the following report:—

The first and second sections of the Royal Society of Canada, in joint meeting, according to the resolution of the Society referring the subject to them, respectfully beg to recommend as follows:—

1st. That the Society pass a resolution drawing the attention of the respective governments of the Dominion and the various provinces, as well as the municipal authorities, to the importance of preserving historical monuments, sites, buildings, archives and relics throughout Canada in view of the constant and increasing danger of their disappearance; and that the Honorary Secretary be requested to prepare printed copies of the resolution and cause it to be transmitted to the various authorities concerned and to the press.

2nd. That the Society also pass a resolution praying the City Council of Montreal to apply the principle of the foregoing resolution specially to the case of the Chateau de Ramezay.

The following resolutions were thereupon passed:—

Moved by Honourable Senator Poirier, seconded by Duncan C. Scott:—

That the Royal Society of Canada, in annual meeting assembled at Ottawa, respectfully asks the attention of the Dominion Government and of the governments of the various provinces, as well as of municipal authorities, to the urgent importance of preserving historical monuments, sites, buildings, archives, and relics throughout Canada in view of the constant and increasing danger of their disappearance; and that the Honorary Secretary be requested to prepare printed copies of this resolution and cause it to be transmitted to the various authorities concerned and to the press.

Moved by Col. Denison, seconded by Benjamin Sulte, and carried:—

That a copy of the resolution of the Society relative to preserving historical monuments be transmitted to the City Council of Montreal and that the Society pray the said Council to apply the principle of the said resolution specially to the case of the venerable Chateau de Ramezay.

It was then moved by W. D. Lighthall, seconded by Rev. Dr. Bryce and carried:—

That the council of the Society be instructed to study the subject of legislation for the protection and preservation of historical buildings and objects with a view to the introduction of legislation through-

out Canada on lines similar to that which is in operation in European countries.

Moved by Duncan C. Scott, seconded by Dr. William Saunders, and carried:—

That a vote of thanks be presented to Dr. T. Gibson and Mr. D. Heins for their kindness in assisting at Dr. Mills's lecture and to Messrs. Orme for the gratuitous use of a piano for the said occasion. A copy to be transmitted to the gentlemen concerned.

Moved by Archbishop O'Brien, seconded by W. W. Campbell, and carried:—

That the sincere thanks of the Royal Society be presented to Principal White for his kindness in permitting the Society to hold its meetings in the rooms of the Normal School Building.

REPORT OF SECTION I.

Mr. Benjamin Sulte presented the following report from Section I. :—

Société Royale, Section I.
21 mai 1903.

La section a l'honneur de faire rapport que durant les séances des 19 au 21 mai 1903, les membres dont les noms suivent étaient présents et ont pris part aux travaux: —

MM. Bellemare, Bourassa, David, DeCelles, Fréchette, Chapais, Gagnon, Poirier, Poisson, Richard et Sulte.

M. P. B. Casgrain représentant la Société Littéraire et Historique de Québec, et le Révérend J. L. Morin, représentant la Société Littéraire de Montréal, ont aussi assisté à nos séances.

Les travaux lus et recommandés pour l'impression sont les suivants: —

Le père Sébastien Rasle, par le Dr Dionne.

Livres Canadiens-français publiés de 1800 *à* 1900, par le Dr Dionne.

Découverte du Mississippi, par M. B. Sulte.

Les Intendants de la Nouvelle France, par M. Régis Roy.

La Fontaine d'Abraham Martin, par M. P. B. Casgrain.

La Dime au Canada, par l'Abbé Gosselin.

Le Labrador, par l'Abbé Gosselin.

Irenna la Huronne, poëme, par M. LeMay.

L'Acadie en 1749-1752, par M. Placide Gaudet.

Le Mouvement Intellectuel chez les Canadiens-français, par l'Honorable Pascal Poirier.

Monographie de Jean et Sébastien Cabot, par l'Honorable Pascal Poirier.

La Noblesse au Canada et en Acadie, par l'Abbé Bourassa.

Les officers élus pour l'année qui commence sont :—

M. Poisson, Président.

M. David, Vice-Président.

M. Gérin, Secrétaire.

Le tout respectueusement soumis,

PASCAL POIRIER, Président.

A. POISSON, Vice-Président.

BENJAMIN SULTE, Secrétaire *pro tem.*

REPORT OF SECTION II.

Mr. W. W. Campbell presented the report of Section II.

Section II. held five meetings. Officers elected:—

President, Rev. Dr. Bryce.

Vice-President, Mr. W. D. Lighthall.

Secretary, Mr. W. Wilfred Campbell.

Printing Committee: President, Secretary, Mr. LeSueur, Mr. Lighthall, Mr. D. C. Scott.

New Members: This section has elected for membership this year Dr. W. D. LeSueur.

In conjunction with Section I. this section has appointed a committee to draft a resolution concerning the preservation of public monuments, etc.

Thirteen papers were presented to the section. Several of them were read in full at the meetings. Among them was one of unusual interest: Several Ethnological Types of Rupert's Land, by Rev. Dr. Bryce.

The other papers were read by title or in part. A complete list of the papers presented are attached to this report.

W. WILFRED CAMPBELL,
Secretary.

LIST OF PAPERS.

1. Latest Lights on the Cabot Controversy. By Right Rev. Bishop Howley, D.D., of St. John's, Newfoundland.

2. The Col. Talbot Papers. By James H. Coyne, B.A. Presented by W. Wilfred Campbell.

3. The Copper Currency of the Canadian Banks, 1837-1857. By R. W. McLachlan, Montreal. Presented by Dr. S. E. Dawson.

4. The Second Legislature of Upper Canada, 1796-1800. By C. C. James, Toronto. Presented by W. Wilfred Campbell.

5. The Lake of the Woods Tragedy. By Lawrence J. Burpee. Presented by W. Wilfred Campbell.

6. Several Ethnological Types of Rupert's Land. By Rev. Dr. G. Bryce, of Winnipeg.

7. Evolution and Degeneration of Party in Politics—A Study in Political History. By Rev. N. Burwash, S.T.D., Toronto.

8. A Few Remarks on the Siege of Quebec and the Battle of the Plains of Abraham. By P. B. Casgrain, K.C., of Quebec. Presented by B. Sulte.

9. Lieut. Col. Caldwell, father of Sir John Caldwell. By Sir James M. LeMoine, D.C.L., of Quebec.

10. A Monograph of the Historic and Physiographic Factors Determining the Distribution and Nationality of Settlements in New Brunswick. (Contributions to the History of New Brunswick, No. 6). By W. F. Ganong, M.A., Ph.D. Presented by Dr. S. E. Dawson.

11. Death of Dulhut. By William McLennan, Montreal.

12. The Gaelic Folk Song of Canada. By Alexander Fraser. Presented by W. Wilfred Campbell.

13. Totemism. By Rev. Chas. Hill-Tout.

GENERAL BUSINESS.

The special Committee to which had been referred the letters and telegrams inviting the Royal Society to hold its next annual meeting at St. John, New Brunswick, on the occasion of the proposed Champlain ter-centenary, reported as follows:—

That the most cordial thanks of the Royal Society be given now for the St. John, New Brunswick, invitations; and that it would be very gratifying to the whole Society to accept, provided that satisfactory arrangements can be made—meanwhile that the whole matter be referred to the Council with power to act as may seem best.

On motion of Honourable Pascal Poirier, seconded by Sir Sandford Fleming, the report was adopted by the Society and the matter was left in the hands of the Council.

Moved by Abbé Bourassa, seconded by Dr. Burgess:

That thanks be expressed by the Royal Society to all those who on the occasion of this annual meeting have shown hospitality to the members; and that thanks be tendered particularly to the President and Lady Grant, to Dr. and Mrs. Saunders and to the resident Fellows in Ottawa. Carried.

Moved by Dr. Ells, seconded by Dr. Ami:

That the Royal Society in general session assembled hereby empower the General Committee appointed by this Society *re* the Inter-

national Geological Congress to make all necessary arrangements respecting the proposed visit of said Congress. Carried.

Moved by Dr. Ami, seconded by Rev. Dr. Bryce, and carried:

That the Ethnological Committee of the Royal Society be reappointed, with power to add to their number.

Moved by His Grace Archbishop O'Brien, seconded by Rev. Dr. Bryce:—

That the Royal Society of Canada assembled respectfully and strongly urge the Government of Canada to move promptly in the erection of a National Museum for the proper housing of the priceless collections already existing.

The Royal Society would also suggest that provisions be made for proper accommodation for the meetings of this Society and of the valuable library of the Society. Carried.

Moved by Archbishop O'Brien, seconded by Sir Sandford Fleming, and carried unanimously:

That the respectful condolences of the Royal Society of Canada be conveyed to Lady Bourinot on the death of her husband, who for so many years was its efficient Secretary, and also an expression of its sincere appreciation of his services to the Society, together with the hope that she may be comforted and sustained in her grievous affliction.

As some papers remained to be disposed of in Sections III. and IV. final reports could not be presented before the close of the general meeting. On motion it was ordered that the reports should be sent to the Honorary Secretary and included in the minutes of the meeting.

The Honorary Secretary called the especial attention of Fellows to Rule X. concerning the publication of papers, and pointed out that the law of the Society is that all papers shall in the first instance be handed to the Secretaries of the respective sections, and that from them such as are to be printed are sent to the Honorary Secretary.

The Committee on a proposed Hydrographic Survey Department for the Coasts of the Dominion reported by Dr. Alex. Johnson, as follows:—

Royal Society of Canada, May, 1903.

Report of Committee on proposed "Hydrographic Survey Department for the Coasts of the Dominion."

Your Committee beg leave to report that, at an interview this morning, they were received most courteously by the Minister of

Marine, and that the result of the discussion which then took place was most encouraging.

It was pointed out that while the Dominion Government provided for the hydrography of the waters and rivers, it did nothing for the coast. The reason for this was that the Government depended on the Admiralty.

A statement was presented showing on good authority that while the Admiralty was doing and would do work of an imperial character, it could not possibly do local work. Its funds were insufficient.

It is obviously difficult to draw a dividing line between what is imperial and what is local.

The Minister undertook to communicate with the Admiralty on the subject so as to settle what Canada must do for itself. The necessary steps could be determined afterwards. This the Committee consider a very important step in advance, and very encouraging.

Captain Bernier, who was present, was able from his personal knowledge to confirm the statement that the present charts were defective. It is further encouraging to know that the Marine Department has purchased a special surveying vessel for the work of the "Tidal Survey." This is in addition to a new vessel, the "Bayfield," purchased for the survey of the lakes and rivers.

For Committee,

A. Johnson,

May 21, 1903. Chairman.

Moved by Sir Sandford Fleming, seconded by Dr. Saunders, and carried:

That the thanks of the Society are due to Dr. S. E. Dawson for his services in taking up the work of the Society and carrying it on as Acting Secretary during the vacancy in the office caused by the death of the late Honorary Secretary.

On motion of Col. Denison the thanks of the Society were tendered to the retiring President, Sir James Grant, for his services during the term of his office as President.

Moved by W. W. Campbell, seconded by Archbishop O'Brien:

That the thanks of the Society are due to the Honorary Treasurer, Dr. James Fletcher, for his services during the long series of years he has filled that office. Carried.

There being no more business before the Society in general session, the President declared the twenty-second meeting of the Royal Society to be closed.

REPORT OF SECTION IV.

Section IV. has the honour to report that five highly interesting sessions have been held. The maximum attendance was thirteen members, with a number of visitors from other sections. Dr. A. E. Barlow of the Geological Survey, was recommended by the section for election to fill a vacancy in this section. Fifteen papers by members of the section were read by their authors either in extenso, in part or by title, whilst two papers were submitted by gentlemen not members of the Society—making in all seventeen papers before the section.

A Committee was appointed to act in connection with the proposed visit of the International Geological Congress to Canada in 1906.

A resolution was adopted, expressive of the desirability of a draft report of the Council being sent to the members of the Society in advance of the annual meeting.

The section is unanimously of the opinion that the Government should be further urged to provide proper building accommodation for the Geological Survey Department. This matter to be referred to the general meeting of the Society for its consideration.

The election of officers for the ensuing year resulted as follows:—

For President—Dr. G. U. Hay.

For Vice-President—Prof. Fowler.

For Secretary—Mr. Lawrence Lambe.

All of which is respectfully submitted.

LAWRENCE LAMBE,
Secretary *pro tem.*

REPORT OF THE SUB-COMMITTEE ON THE NOMENCLATURE OF GEOLOGICAL FORMATIONS IN CANADA.

OTTAWA, May 16th, 1903.

A meeting of the Ottawa members of this Sub-Committee was held in March last, at which the subject was fully discussed. A circular, asking for comments on the scheme of Geological nomenclature, etc., submitted by Dr. Selwyn, in 1881, to the Bologna Congress, and published in the Report of Progress of the Geological Survey of Canada for 1880-81-82, was drawn up and sent to each of the specialists of the Geological Survey staff. The answers to this circular have not yet been fully considered, but, on the whole, they would seem to show that there is a general consensus of opinion that the time has come when Dr. Selwyn's scheme could be advantageously modified in accordance with the terminology adopted by the International Congress of Geologists.

At a meeting of the Geological Society of America, held at Washington in December last, it was arranged between Dr. Bell and Dr. Walcott, that a special Committee, to consist of Dr. Bell and Dr. F. D. Adams, for the Canadian Geological Survey, and another Canadian geologist yet to be selected, but not a member of the Geological Survey staff, to represent Canada, Prof. Van Hise and Dr. Keith, for the United States Geological Survey, and Prof. Seaman, to represent the United States, be appointed to consider the nomenclature and classification of the Pre-Cambrian rocks of North America.

Signed on behalf of the Sub-Committee,

J. F. WHITEAVES.

The following papers were read:—

1. Results of some Experiments with Fertilizers on Important Farm crops during the past 15 years. By Dr. William Saunders.

2. Bibliography of Canadian Geology and Palæontology for the Year 1902. By Dr. H. M. Ami.

3. Canadian Geological Chronograph: or the succession of Geological Formations in Canada. By Dr. H. M. Ami.

4. Memoir of the late Dr. A. R. C. Selwyn, C.M.G. By Dr. H. M. Ami.

5. An attempt to classify Palæozoic Batrachian foot-prints. By Dr. G. F. Matthew.

6. Notes on Tertiary Plants. By Professor D. P. Penhallow.

7. A submerged tributary of the great pre-glacial river of the Gulf of St. Lawrence. By H. S. Poole.

8. Notes on some interesting Rock-contacts in the Kingston District, Ont. By R. W. Ells, LL.D.

9. Francis Bain, the Prince Edward Island Geologist. A sketch of his life and of the work accomplished in the study of the rock formations of his native province. By Lawrence W. Watson. Presented by Dr. R. W. Ells.

10. Presidential Address to Section. Some aspects of the Evolution of comparative Pathology. By Professor Wesley Mills.

11. An experimental inquiry into the effects of the blood serum of normal and immunized goats upon tuberculous processes. By Albert George Nicholls, M.D. Presented by Dr. J. G. Adami.

12. The complex pharyngeal teeth of Poronotus, with notes on the development of pharyngeal teeth in fishes generally. By Professor E. E. Prince.

13. Description of two rare cases of Meristic Variation in the large claws of the lobster—illustrated with specimens. By Professor E. E. Prince.

14. Bibliography of Canadian Entomology for the year 1902. By Reverend C. J. S. Bethune, D.C.L.

15. Bibliography of Canadian Zoology for 1902, exclusive of Entomology. By Dr. J. F. Whiteaves.

16. On the relation of Moisture-content to hardiness in Apple Twigs. By Frank T. Shutt.

17. Descriptions of some new species and varieties of Canadian Butterflies. By James Fletcher, LL.D.

REPORT OF SECTION III.

The third section held five meetings, the following members being present: C. Baillairgé, Dr. H. T. Barnes, Prof. N. F. Dupuis, E. Deville, Dr. W. H. Ellis, Sir Sandford Fleming, Dr. G. P. Girdwood, Prof. J. C. Glashan, Dr. G. C. Hoffmann, Prof. A. Johnson, T. Keefer, President J. T. Loudon, T. Macfarlane, Prof. C. H. McLeod, Prof. F. T. Shutt, R. F. Stupart.

The election of a new member having been referred to the section by Council, Dr. J. C. McLennan, of Toronto University, was selected and his election confirmed by the Society.

Eighteen papers, of which a list is appended, were read and discussed before the section.

The officers elected for the ensuing year are as follows:—

President. Dr. W. H. Ellis.

Vice-President. Prof. E. Rutherford.

Secretary E. Deville.

E. Deville,
Secretary.

Papers Read before Section III.

1.—"On the Resistance of a Hydrated Electrolyte, and its Relation to the Density-Concentration Curve." By H. T. Barnes, D.Sc., and J. Guy W. Johnson, B.A.

2.—"Description of Apparatus by the late Dr. Rudolph Koenig, of Paris, for the Projection of various Wave Movements." By President J. Loudon.

3.—"The Radioactivity of Ordinary Metals." By Prof. J. C. McLennan, and E. F. Burton, B.A. Presented by President J. Loudon.

4.—"The Formula of one of the Natural Sulphides." By Prof. E. J. Harrington.

5.—"On the Radiation Correction in Methods of Calorimetry." By Howard T. Barnes, D.Sc.

6.—"The North Pole of the Earth." By C. Baillairgé, M.A., C.E.

7.—"The Oxalates of Bismuth." By Dr. F. B. Allan. Presented by Prof. W. Lash Miller.

8.—"Numerical Values of certain Functions Involving e^{-x}." By Prof. W. Lash Miller and Prof. T. R. Roseburgh.

9.—"Researches in Physical Chemistry carried out in the University of Toronto during the past Year." By Prof. W. Lash Miller.

10.—"The Application of Fourier's Series to the Determination of the Forms of Cams to effect given Displacements, Velocities and Accelerations." By Dr. Coker. Presented by Dr. Henry T. Bovey.

11.—"A Laboratory Apparatus for applying Bending and Torsional Moments Simultaneously." By Dr. Coker. Presented by Dr. Henry T. Bovey.

12.—"On the Analysis of Cheese." By Thomas Macfarlane.

13.—"Seismology in Canada." By R. F. Stupart.

14.—"The Climate of the Canadian Northwest Territories." By R. F. Stupart.

15.—"A Compensated Air Thermometer." By H. M. Tory, M.A., D.Sc. Presented by Prof. Cox.

16.—"Composition of Coal from the Crow's Nest Pass." By W. H. Ellis.

17.—"A Study of the Decomposition of Potassium Chlorate by Heat." By S. E. Chadsey. Presented by Dr. W. H. Ellis.

18.—"Note on an Apparently Accidental Formation of Frazil Ice in a Cryophorus. By Prof. John Cox.

APPENDIX A

BRAIN POWER; HOW TO PRESERVE IT

By Sir James Grant, M.D., K.C.M.G.
President Royal Society of Canada

PRESIDENTIAL ADDRESS

I am confident I am expressing the sympathies and feelings of this large audience in the Capital of the Dominion of Canada, when I say, that we, one and all, rejoice that His Most Gracious Majesty, King Edward has been restored to health, and annointed King over a loyal and united Empire.

Twenty-one years ago, at a meeting held at Government House, Ottawa, this Society was determined upon by Lord Lorne, now Duke of Argyll, and shortly afterwards called into action, with the late Sir William Dawson as first President. Since that date, the meetings with few exceptions, have been held at Ottawa, and the present records of the Society point to a widely diversified line of work, in its various departments, all of which gives undoubted evidence of intellectual development, of which any colony in the Empire might justly feel proud. The duty, which by the kindness of the Council of this Society, I am called upon to perform, I regret has not fallen into other hands. In accepting the task, I feel confident of the sympathy of my audience. It is a matter of satisfaction to know that the success of such meetings, does not depend on the occupant of the presidential chair, but is chiefly due to the eminent workers in the various sections of the Society.

The energy and marked ability of the late General Secretary, Sir John Bourinot, who since the incipient stage of development of the Society, brought to light facts of the greatest moment, as to men and measures, in all parts of our Dominion, redounding greatly to the credit of one, who by his painstaking research and scholarly attainments, has left an imperishable record on this continent. Edward Gibbon charmingly expressed the idea, that diligence and accuracy, are the only merits, which an historical writer can ascribe to himself. So in scientific research, like qualifications are cardinal qualities. To decide on the true significance of data, springing daily from the vast sources of scientific investigation the result of observations and experiments, a well balanced mind, and careful reflection are necessary, to winnow out the practical and useful, from the doubtful and uncertain. Investigation and experiment are widespread, and as to results, fortunately, there is greatly increased reliance. Doubt, says Thackeray, is always crying pshaw.

We must not begin by doubting, but by doing, and then sifting. A thousand doubters would not make a Lister, a Pasteur, or a Koch. Aristotle says, if you doubt you must doubt well, but to doubt well, you must first work well. I feel confident that one of the highest aspirations of this Society, is that its observations, from year to year, may fructify and extend into all lands, and the reciprocity of feeling and action aroused, strengthen the scientific and literary ties of the world. In this prospective development we must all endeavour to assist.

The flame of science must burn within as a vestal fire. Drudgery and long waiting for opportunity, are truly discouraging, but the Divine Spark will not disappear, while the investigator is true and honourable, and keeping such in view for pure purposes. As a rule lecturers are teachers in a sense and their work lives after them.

Voltaire says of Virgil, that he was Homer's greatest achievement. Dante was Virgil's greatest light. In science we find precisely the same. The man passes away, but his work remains after him, and so in the records of our Society, we trust an influence will be exercised such as will redound to the credit of this Association.

Our annual meetings present a feature of great interest in the reports of the Allied Scientific Societies throughout the Dominion. It is needless to say how welcome are the representatives, and how much we value their taking part in our discussions, and thus stimulating, in a most encouraging manner, the interchange of thought, which widens the area of scientific research.

The subject which I have chosen for the present occasion is "Brain Power and How to Preserve It." In the days of the Ancient Greeks, the composition of the human body was in a measure defined by Aristotle, as being composed of parts, differing from each other in form, consistency, colour and texture. In these diversified parts, brain and nerve tissues, are exceedingly important factors. Not, however, until the concluding years of the last century, was an impetus given to anatomical research by the Hunters of England, the Meckels of Germany, as well as Cuvier and St. Hilaire of France, by whose untiring researches, the minute structure of animal tissues was placed on a more defined and uniform basis. In the past century, great light was thrown on the entire subject of general anatomy by Xavier Bichat, one of the most accurate observers in all France in the Napoleonic Era. The most remarkable advance, however, was made in the third decennium of the past century, by improving the methods of examining minute objects, by compound lenses. For more than a half a century, microscopes have extended the domain of biological science, as to bring within our comprehension, a clearly defined basis of human structure, such as could not fail to convey a tolerably correct idea of functional

activity in the human system. In 1831, the celebrated botanist, Robert Brown, announced for the first time, that an aureola or nucleus was seen in many plants, and that this circular spot, was present in each cell. In 1839, Theodore Schwann discovered that there was one universal principle of development in the elementary part of organisms, consisting in the formation of cells. This great advance in biological science is undoubtedly the most important feature of the past century, and one which has given an impetus to physiological investigations, of vast moment to the entire human race owing to the influence, thus exercised on the progress of practical medicine.

John Goodsir, the great anatomist of Edinburgh, announced in 1842, that the nucleus is the reproductive organ of the cell, and that new cells are formed from it, in fact, that an organic continuity existed between the mother cell and its descendants, through the nucleus. Virchow in his Cellular Pathology, 1858, maintained that in pathological structures, there is actually no cell development *de novo*: Where a cell is found, there must have been a cell before, in fact, cell development is continuous by descent.

In 1842 John Goodsir established the principle that cells are the ultimate secreting agents. A nerve cell is not a secreting cell, however, like the general glandular cells of the system. Nerve cells through the remarkable changes which take place in them, generate that form of energy, known to exist as a special outcome of a nervous system and defined as "Nerve Energy" or "Nerve Force." A nerve fibre is actually an essential part of the cell with which it is continuous, and the cell and nerve fibre associated make up what is termed a neuron, now known to play so important a role in the entire nervous system.

The brain, like other parts of the body, may be in a state of activity, or of fatigue. When active, the nucleus increases in size, and when fatigued, the neucleus diminishes, and finally shrivels up, becoming in fact, useless, as far as functional activity is concerned. It is very remarkable that nerve cells have not the power of reproducing their kind, their especial power being closely connected with the evolution of nerve energy. This is a point on which I desire to place particular stress as once a portion of the brain, or other nerve centre is destroyed, new brain material or a new nerve centre, cannot be produced, to replace the injured parts, as takes place in other portions of the human frame, where bones, tendons, and such like are injured, nature comes to the relief, by new tissue in every respect analogous to the part destroyed. This forms the key note to the subject matter in hand, and demonstrates beyond doubt, with what care and watchfulness, nerve tissue should be guarded, to retain

intact, normal mental vigour and ordinary nerve power. Passing now from minute cellular facts to general principles, I am confident you will agree with me in the statement that "brains rule the world and the individual." The great problem of the present day, with which our educationists as a whole, have to deal, in the midst of a varied practical experience, is "how to build the best brains out of the material at our disposal." Not for men only but for women as well. The best possible brains for both sexes, is the surest way of strengthening the fabric of our generation. As a good brain is required for the management of the home, as the guidance of the State, as in both sexes, the force evolved, more than any other force in the system, enables men and women, by interdependence and normal aptitude, to bear the burdens of life, and perform their duties and responsibilities with dignity, grace and home spun individuality. These are the peculiarities which make a people, and crown with success their efforts in life. The great social problem of the present day, is "The Building of a Brain," and the influence exercised in this direction, devolves largely on our teachers, the very pioneers of our educational system. It must be built up with careful attention to the rest of the body, as no perfect brain, crowns an imperfectly developed body. As the brain furnishes the physical support of mental activity, it is reasonable to expect this will vary with the precise condition of this organ. Excessive brain work tends to exhaust nervous energy, and at the same time lower mental power and efficiency. In children where the stock of brain vigour, is in proportion to structural development, the indications of fatigue, crop out much sooner, and it is exceedingly important, that brain energy should not be overtaxed, but rather in proportion to the normal supply. As Herbert Spencer has charmingly expressed it, "the development of the higher mental faculties is only safe, and in fact normal, when a firm basis of physical strength and well being has been laid down." To force on the functions in advance, is likely to endanger the very structure of the brain, and in time diminish seriously intellectual activity. Fabre tells us that "childhood is a time of endless learning," not of "endless cramming," and fortunately this view of the subject is gaining ground rapidly. Beecher said, the power of "doing, is education, not how much a man knows, but how much he can accomplish by putting his faculties into operation. Many know, and know, and know, and actually keep on knowing until they have lost the power of doing; and so with eating, some go on eating and eating, until it takes the entire strength of the system to carry them along." So by excessive knowledge, the mind is liable to grow stupid and fat. True education, sound brain culture, is the faculty of turning it to practical account.

How absolutely useless is the man who knows everything and can do nothing perfectly , the very common sense being educated out of him. This is in fact almost a diseased state of mind, not likely to result in the highest achievements of either mental or physical development.

This is a progressive age, an age of specialty, and when the natural bent of the youth's mind is known, greater excellence will be attained in the future life of the child, by directing education to meet natural capacity. As Gorst has well and ably expressed it, " The aim of education should be to get the best out of each individual, and not to obtain an average of mediocrity," " and that the enormous expenditure of public money upon the production of machine made human automata, is sheer waste." Fortunately, a marked change for the better is now in progress in educational matters. Norman schools, manual training schools, such as introduced into Canada by Sir William McDonald, and technical education as advocated by Andrew Carnegie all have their places, and exercise prudently, their power and educational influence. The kindergarten system, at the ages of six and seven years, as advocated by Fraebel and successors, in the primary grades of our public school system, is accomplishing much good, and safe educational work, intellectual and physical development, keeping pace with each other.

Dr. Newsholme, Health Officer for Brighton, England, has recently pointed out, the lower age limit of children for school attendance. (Public Health Record, 1902.) The chief plea is that children under five years of age should be excluded from public elementary schools. On the roll of infant schools in England and Wales, between the ages of two and three years, and four and five years, constituted in 1900, about 10·9 per cent of the total scholars of all ages in elementary schools, chiefly owing to the fact that many mothers engaged in other daily work, seek this method of being relieved of the charge of their children, for four or five hours daily. The occasional advice of school teachers, that the sooner children are sent to school, the better, leads to the same result. Premature school attendance is most decidedly injurious and gradually saps brain vitality, and followed, in time, by both mental and physical deterioration. Doubtless the first seven years of life are for growth, rather than for elaboration of structure and function, and by far the most important point is that a large preventable loss of life is the result, of school attendance at ages under five years, the difficulty in the great proportion of the deaths commencing by the overstrain of the brain, in the very formative process of thought. The important point is the death rate from communicable diseases under five years of age, is greater and the fatality more than in ages higher. Physical training and the cultivation of observation

and discipline are precedent in the young child, but any serious attempt at intellectual education, before five years is contraindicated by the present knowledge of brain structure and function.

Fortunately in Canada children rarely attend school before five or seven years, and every degree of care and prudence are exercised, to guard the gradual development of intellectual activity.

Nowadays we really want our young people trained, so as to become in every possible way, useful members of society. Right judgment is only developed by discipline, all of which springs from method and study. No educational training, no turning over of the pabulum of thought, the brain, will at once fit a lad for any particular calling in life. The chief test of education is the outcome of his life at maturity. This constitutes the practical examination of life, and the practical verdict is the outcome at the period of manhood. Here we have the very process of development, and the result attained. This training is the actual building of a brain. It is difficult to give even an outline of the extremely delicate and complicated operation of the human brain, of which there are not two alike, in the entire human family, and yet we frequently expect equal results of brain power, contrary to the very gifts of natural capacity. The school of life is the one for which our young generation has to be fitted, and as Bishop Creighton, of London, has ably expressed it, the chief teacher is the actual experience which one undergoes. The best built brain is that which arouses some interest which will follow through life, and lead to results of a practical and telling character. Thus the mind becomes equipped so as to enable it to grapple successfully with the emergencies of life. This is, in fact, the very basis of technical education, so much in keeping with the progress and general advancement of the age. The indispensable object of education is to build a brain, and if possible, to build one strong and vigorous, guarding carefully surrounding circumstances, so that strength of body and strength of brain, may constitute the balance, so requisite for a useful and practical calling.

In brain weights and intellectual capacity, according to Esquiral, no size or form of head is incident to idiocy or to superior talent. The largest weight of brain known, is that of the Russian novelist, Turgenieff whose brain weighed, at the time of his death, (65 years of age) 71 ounces. The following celebrated group:—Jeffery, Thackeray, Cuvier, Combe, Spurzheim and Sir James Simpson, had brain weights from 54 to 58·6 ounces. A second important group of men of rare genius and marked ability, Hubert, Grote, Babbage, Leibey, Gull and Gambetta, had an average brain weight from 40 to 49 ounces. Colder climates appear to favour large brains, which may in a measure account

for the marked intellectual activity of our Canadian people. The table of average brain weights of various nationalities, from Topinards and Manouvrier's Authropological publications, produce evidence of greater brain weights in colder climates. As proof of such, it is known that the colder air of the United States, produces larger brains in the negroes than the warm air of South Africa. Weighing the brain is the only certain method of settling its exact proportions. The fluid inside the skull, known as the cerebro-spinal, may occupy considerable space, in the cranial cavity, and a small brain may be present. It is not usual to find large brains, with small minds, in proof of which Dr. Sims (Popular Science Monthly, 1898) records 125 persons of ordinary or weak minds, whose brains were larger than those of many distinguished and well-known men. Daniel Webster, Agazziz, Napoleon I, Lord Byron, Baron Dupuytren and General Skoboleff of Russia, world renowned men, whose brains weighed less than 53 ounces. In fact the present impression is, that very intelligent men do not differ greatly as to brain weights from the less gifted. Dr. Oliver Wendell Holmes, the well-known author of "The Professor at Breakfast Table" and a celebrated anatomist said "the walls of the head are double with a great chamber of air between them, over the smallest and most crowded organs. Can you tell me how much money is in a safe which has thick walls by kneading the knobs with your fingers? So when a man fumbles about my head and talks about the organs of individuality, size, &c., I trust him as much as I should if he felt over the outside of my strong box, and told me that there was a five dollar bill under that rivet." Again, larger and complicated brain convolutions are by some, supposed to be associated with superior mental power. In the lower animals such is not borne out. Rodents, such as beavers, rats and mice, have little brain and no convolutions and the beaver particularly exhibits great mechanical skill in the construction of dams and storing of food for the winter. The sheep has numerous convolutions in the brain with well marked evidence of great stupidity. Wagner of Gottingen, states he has never seen examples of highly complicated convolutions, even among eminent men whose brains he examined. Special mental gifts have not so far been proved to be the result of many convolutions.

Again, we know that exercise and training strengthen the brain and increase its weight and size in man, of which Gladstone was a remarkable instance. All things considered, the prospect is that brain will still go on developing towards marked increased activity, and practical usefulness, in the genus homo.

The physical aspect of the brain power presents many points of interest. We can observe and study the brain and determine upon

what conditions this complicated organ acts, vigorously or otherwise? Is a good brain likely to accompany a good physique? It has been most conclusively pointed out that brain or marked ability in any particular line of thought and action, is superior in size, weight and complexity of structure, to the ordinary brain. A popular idea is that brain must be developed at the expense of muscle and vice versa. Such views fortunately are not borne out by either science or history. Professor Beard's views on the longevity of brain workers is an important document. Take members of the cabinets of England and Canada, or the congress of the American Republic, the average in height, weight, girth and physical development generally, is most remarkable. The law of the dependence of mental activity, is in fact, closely allied to physical vigour. Lincoln, Conkling and Gladstone retained a quantum of physical power, each in a particular line, rail splitting, boxing and tree felling, and so with Tennyson, Beecher, Huxley and Webster, each had his day of physical training as well as of mental culture. With such evidences, is intellectual greatness the only thing worth striving for and physical prowess a matter of secondary consideration? Gorging the brain in ordinary schools from six to nine hours daily, with only one to three hours each day, in the open air, is really not likely to bring about such results as frequently sought after. With many years of practical observation on this point, I feel confident the intellectual development and physical growth of the young generation around us, will be greatly promoted by four hours of exercise in the open air, and four hours of study, and the final results better in every particular, than by the system now in operation. The facts noted by Chadwick of England, of factory children are most valuable. The "half time system" giving four hours of regular work in the factory, and four hours of study have been followed by remarkable results, in fact the progress in education is more marked than with children who spent the eight hours in study. The leaders in brain work in both England and the continent to-day, give three to five hours daily to the desk or laboratory. Such data point to the necessity of an equal exercise of mental and physical capacity, in order to build up successfully mental and physical power. The most precious truths, like the most precious metals are in small space. All are agreed that the problems of the universe, so far as physiologists have been able to define them, are really locked in "the cerebral cell." This is an interesting time in the new life of our Dominion and the sports and games of university men, and young people generally, are such that we cannot agree in the idea that the reign of bone and muscle is over, and that the reign of brain and nerves, is taking its place, even with the cerebral cell under lock and key. Many suits of armour in the tower of London, would not fit

our youths of 18 to-day, and it is a well-known fact, that the stone coffins, sarcophagi, are fully half a head too short for our average Canadian. As to feats of physical prowess, such as football, hockey, running and leaping, our young athletes hold first rank, and such developed activity has not lessened their mental culture. Under such circumstances the brain is not a silent receptacle, but a "copious promptuary" of learning and device. Games, says Sir James Paget, are admirable, in all the chief constituent qualities of recreations, but besides this, they exercise a moral influence of great value in business or in daily work. Professor Sir Michael Foster in two recent Rede Lectures to the Royal Society, London, tells us, that even in muscular work, the weariness of the brain, like the work of the muscles, is accompanied by chemical change; that the chemical changes, though differing in detail, are of the same order, in the brain "as in the muscle." "If there be any truth in what I have laid before you, (says Foster) the sound way to extend those limits, is not so much by rendering the brain agile, as by encouraging the humbler help-mates, so that their more efficient co-operation, may defer the onset of weakness." Games not only keep a man healthy, but encourage his work and give him a better knowledge of his associates. The Duke of Wellington truly said, the Battle of Waterloo was won in the playfields of Eton. Let games in the proper sense, be the recreation and not the business of life. Thus will brain power gain full force, and conduce to the success of the varied duties of life.

After all, a young man with nothing but brains would be a poor object in life. It is the battle of ideas we require, and he who is not up to the mark, must eventually take a back seat. A combination of brain and muscle won the battle of Paardeberg which has placed Canada to-day in an honoured position throughout the civilized world.

I have presented to you on the present occasion the known groundwork as to the best and safest means of preserving brain power, and at the same time, to so guard the complicated nervous machinery of the human system, as to preserve health and strength, and develop the pabulum of thought, to meet the wants and requirements of an exacting age. Owing to the progress in brain knowledge within the past thirty or forty years we look forward with great hopes to the outcome of this twentieth century, during which many of the principles presented on the present occasion will doubtless be established, on a sound and substantial basis. Throughout let that idea guide and direct our efforts with the hope that the charming words of Wordsworth may be fully realized:—

> "In the unreasoning progress of the world,
> A wiser spirit is at work for us,
> A better eye than ours."

APPENDIX B

MARINE AND LAKE BIOLOGICAL STATIONS OF CANADA

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Atlantic Biological Station.

The Marine Biological Station of Canada remained at Canso, N.S., for a second season, in accordance with the decision of the board of management at their meeting held in June, 1901, at Canso. It was apparent to the board that a single season spent at a new location was not sufficient to allow either of a thorough investigation of the biological features of the adjacent waters, or of the completion of researches carried on by the scientific staff of the station in each newly selected locality. Hence, as was found to be desirable at St. Andrews, New Brunswick, where the station commenced its important work, so at Canso, the location next chosen on the coast of eastern Nova Scotia, it was regarded as essential that the fishery investigations and cognate work should be continued a second year, before the removal of the Station to a new site was discussed and decided upon. The operations at Canso have been in the highest degree important and successful, and a second series of reports is almost ready for publication which will embody more material, and be of no less practical significance than the first series published in 1901, and entitled "Contributions to Canadian Biology, being studies from the Marine Biological Station of Canada, 1901."

Unfortunately the early months of the season were unusually stormy, and most unfavourable for pursuing investigations in the waters off Guysborough County and the Island of Cape Breton. The Director of the Station (Professor E. E. Prince) was, moreover, prevented by urgent departmental engagements from attending as usual, and aiding in carrying out the scheme of work which has been planned for the year. Fortunately, Professor R. Ramsay Wright, Assistant Director, was able to arrange for a lengthened stay and, indeed, spent the summer at Canso. Under his skilled and energetic guidance, a large amount of eminently successful and productive work was done. The laborious "Plankton" investigations commenced by Dr. Wright during the season of 1901 were assiduously continued until the close of the Station's operations last fall. The minute floating forms of marine life, which contribute so largely to the sustenance of young fishes in the sea, and which constitute the wonderfully varied and varying Plankton, have formed the subject of extensive and exhaustive studies in other countries, in Germany, France, Norway, the United States and

the British Islands; but no systematic work of this kind has been attempted before in the Atlantic waters of Canada. Professor Wright's report, now nearly ready for publication, will form a new and important contribution to fishery science and biological research on this continent. Again, the investigation conducted by Professor Knight, Queen's University, Kingston, Ontario, into the effects of sawdust and other pollutions in waters frequented by fish, which has been commenced at St. Andrews in 1900, were continued during the past year. The early portion of the work was carried on upon the seacoast adjacent to the station; but in order to render the scope of the investigation as complete and inclusive as possible, Dr. Knight found it advantageous to pursue his further researches, upon these matters, in certain inland localities. He did not, therefore, occupy his accustomed table in the laboratory of the Biological Station during the season. The results of his further experiments and observations in Ontario waters will form a desirable and necessary complement to the work carried in the preceding seasons at the station. That these results are of the highest public value and interest, it is hardly necessary to remark, and they sufficiently indicate how directly scientific work conducted by the staff of the Station bears in an economic and commercial sense upon questions of vital moment to the state and the public at large. Of similar practical importance are the results of Professor Knight's able and laborious investigations on the effects of dynamite and similar explosives on fish life in the sea. The recent adoption of a method of killing fish by means of dynamite, especially in Bay of Fundy waters, renders Professor Knight's experiments extremely valuable, as the question is one of widespread and, indeed, international importance.

Dr. Joseph Stafford, of McGill University, who has been untiring in his zealous work each season was again appointed to act as curator and general scientific aid in the station. In addition to pursuing various lines of zoological work Dr. Stafford continued his faunistic studies which has largely occupied him during the two previous years, and his preliminary list of species observed is ready for publication, while his report on some interesting parasites found upon fishes, etc., examined at the station has also been completed. Professor A. B. Macallum, University of Toronto, has followed up his elaborate researches on the chemistry of Medusae and other marine animals in relation to their salt-water environment. Dr. Macallum's report which is about ready for publication will be a notable scientific contribution in a difficult and profound field of investigation. Dr. A. H. MacKay, of Dalhousie University, Superintendent of Education for the Province of Nova Scotia, again, occupied a research table for a portion of the season, and devoted special attention to those interesting inshore

organisms known as the "land Diatoms." His very thorough and masterly study of the Canso Diatomaceæ, shows that no less than seventy-three species are embraced in the collection made at the station.

The station welcomed several new workers, including Mr. F. R. Anderson, Mount Allison University, Sackville, N.B., and Mr. C. B. Robinson, Pictou Academy, Pictou, N.S. Much valuable work was done by these gentlemen and by Mr. C. McLean Fraser, B.A., Assistant in the Biological Department, University of Toronto, and by Mr. George A. Cornish, B.A., Science Master, The Collegiate Institute, Niagara, Ont. The last named member of the staff has completed a descriptive account of the "Fishes of Canso," and of those remarkably interesting invertebrates, the marine Polyzoa, of which a variety of species occurred in the neighbourhood of Canso. Mr. Fraser devoted special attention to the Hydrozoa, and Mr. Anderson studied the Halcarids. Much collecting was done by all, both inshore work, and dredging in the open waters at various depths.

Professor James Fowler, Queen's University, Kingston, has prepared a report on the Flora of Canso, based on the observations and collections made by him during the station's first year on the Guysborough coast, while Professor Prince has ready for publication an account of the larval and post-larval stages of the Gaspereau or Alewife. This last report, and several others above-mentioned will possess additional interest from the original drawings and illustrative plates accompanying the descriptive text.

The work of the station would have been immensely aided if the staff had had at their disposal a small steamer suitable for marine biological investigations. The lack of such a vessel adapted for dredging and deep-sea researches has considerably hampered the staff. It is hoped that such a vessel will be sanctioned by the Government and made available before the close of the coming season. In connection with this suggested vessel the advice and aid of the Prince of Monaco has been sought. Plans and specifications were prepared last fall under the instrumentality of Professor Ramsay Wright and in order that the steamer might be as well adapted as possible for marine researches the advice of the Prince of Monaco is eagerly anticipated by the board of management on account of the Prince's unrivalled practical and scientific experience in deep-sea investigations in various parts of the world.

It may be added that, early in 1903, it is intended to change the location of the station, and by moving it from Canso to Richmond Bay, Prince Edward Island, open up a new and important fishery area. A suitable site inshore has been selected adjacent to the famous Malpeque oyster beds, and it is anticipated that the oyster and other

fishery problems presented in this new area will afford the scientific staff increased opportunities for achieving practical results. The problems offered for solution are unquestionably of the utmost value to the country, as the oyster and lobster fisheries are of prime importance. The fishery operations referred to, carried on in this portion of the Gulf of St. Lawrence are conducted in the waters close to the selected site on the north shore of the Gulf of St. Lawrence.

The Biological Station at the Mouth of the Go-Home River—Georgian Bay.

This Station was established, under the sanction of the Dominion Government in 1901, by Sir Louis Davies, at that time Minister of Marine and Fisheries, with a grant of $1,500 per annum for equipment and maintenance. Its management is entrusted to a committee of members of the scientific faculties of the University of Toronto, of which the President of Victoria College is chairman. The work is under the supervision and approval of the Dominion Commissioner of Fisheries, Dr. Prince.

The headquarters of the station is a permanent building located on Island 121 in Go-Home Bay. The floor space is divided into a large laboratory and four smaller rooms. The small rooms are used as director's room, store room, photographic room and museum. The large room is provided with work tables for biological investigation and for the plotting of the hydrographic survey and will furnish accommodation for ten workers. The centre is occupied by a large table with zinc tray and sinks at either end, and aquaria of various sizes constructed of glass and zinc. The station is also furnished with boat house, dock, boats, fishing and plankton nets, and also microscopes, glassware, reagents, and other apparatus for scientific investigation.

A large hatching pond very favourable for the propagation of the small mouthed black bass has been prepared, and a large number of adult fish placed therein, whose habits are being studied during the spawning season of the present year. Other ponds are in course of construction and when complete will afford opportunity for the study of the more important species of fishes of commercial value.

The primary object of the station is scientific work, but beyond its scientific value it is of great general value as a means of obtaining knowledge available for economic purposes. For the pursuit of this object the location affords unusual advantages. We have swamp and inclosed lake formations, with abundance of aquatic vegetation in the inner waters, there being on one of the islands no less than seven small lakes. There are several inlets with clear water and sandy or gravelly bottom. A large number of outer reefs

afford every variety and depth of rock bottom. Two large bays a mile or more in diameter, give us quiet and deep interior waters, similar in character to the Muskoka Lakes, while the channel of the river gives us deep flowing water. As a foundation for accurate scientific work, a preliminary hydrographic survey of the entire bay is being made, and meteorological observations are made and recorded. The survey, when complete, will give a full account of the depth of water, nature of bottom, currents, quality of water and lake tides, between island 108 and Split Rock, in front and eastward to the coast of the mainland and the mouth of the Go-Home river. The meteorological observations are also being extended to cover the whole year. The hydrographic work is under the direction of Professor C. H. Wright, B.A.Sc., of the Faculty of Applied Science, and the meteorological observations under the direction of Prof. W. J. Loudon, M.A., of the Department of Physics of the University of Toronto.

The biological work is under the direction of B. Arthur Bensley, B.A., Ph.D., of the Biological Department. Dr. Bensley has had the advantage of experience of this branch of laboratory work both in England and Germany, and his ability as a scientist and his broad grasp of the conditions and possibilities of the work, give the committee great confidence in the future success of the station. Dr. R. Ramsay Wright, the head of the Biological Department and Vice-President of the University of Toronto, has given most valuable assistance by his advice at the foundation of the station. Dr. Bensley has also been fortunate in the choice of his subordinates. Mr. Anderson and Mr. Carr are enthusiastic scientists, with decided talents for the practical part of the work and a good deal of experience in field work in natural history. Mr. John Fenton, the caretaker, is a fisherman of more than ordinary intelligence and long experience in these waters.

The following summary of the work already done or planned for, is furnished by Dr. Bensley.

The biological work was directed towards the collection and identification of the fishes of the region, this work being preliminary to the investigation of the various problems of a more economic bearing, and designed to be the subject of the first report. It is hoped that by the end of next season the collections will be complete, or nearly so, and the work will doubtless be of interest, not only to ourselves, but to the museum men of New York and adjacent states who are interested in the distribution of fishes.

Last summer what nets we had available were operated so as to get the specimens from as many environments as possible, without reference to their value as food fishes. The same plan will be followed

during the coming season until the middle of August, when we should have a fairly complete record for the year, apart from those fishes appearing in late fall and early spring. It should be observed, with reference to the collection of fishes, that the region round about offers great variety in the way of environment; as extremes we have swamp and inclosed lake formations with abundant vegetation, and the rocky formations of the reefs, also the moving water of the river passing into the open water of the bay. These ensure the greatest variety of life and the best opportunities of studying the fishes in relation to their environment.

Much of the fish-collecting last summer was done by means of hand-seines and in this way specimens of the young of the food-fishes were taken. Samples of the latter were kept for the special purpose of observing their rate of growth and the examination of their stomach contents. These will be made subjects of special study for the coming season. One of the most important problems which we shall soon have to consider with seriousness is the restocking of depleted waters in an intelligent manner, and it will be of importance to know the food and feeding habits of the young fish used for restocking, at different stages of their growth, and also their reaction to new conditions of feeding. Notable instances of the futility of transplanting young fishes haphazard have already been described. Prof. Needham remarks of two experimental ponds in the Adirondacks which were stocked with trout, that one which had been supplied for years had remained as barren as ever.

Last season samples of the stomachs of the large fishes were obtained for a somewhat similar study, it being our object first to determine what fishes prey upon the adults or young of others and, secondly, to ascertain the feeding habits of the fishes used as food. Cultivation of animals serving as food for edible fishes and destruction of their enemies may be found to be quite as advantageous, if not more so than the artificial rearing of the latter. Last season was much too advanced to make any observations on the spawning habits of the food and game-fishes, but it is hoped that observation will be made during the latter part of the spring spawning period this year. It will be advisable to investigate in this connection the nature of the spawning beds, the size of the smallest spawners, protection of spawn, enemies, and fungus growths. The stomachs of all of the fish kinds and water animals, such as frogs and lake lizards, the latter already known to devour whitefish eggs, must be taken during this period. The presence of a considerable variety of valuable fishes which include the whitefish, lake trout, lake herrings, small and large-mouthed black bass, pike, pickerel and maskinonge is sufficient to warrant the attendance of a special investigator during the whole of the spring and

fall spawning periods, and would have considerable extra value in the estimation of the time required as close season.

It will be observed that the amount of investigation already demanded, even excluding the soundings, estimation of direction and rate of flow of water currents, changes in temperatures and levels, necessary on the hydrographic side, is very great, while the number of responsible workers, in view of the attractions afforded by the Canadian Marine Station, must be small. Thus while collections bearing the various subjects may be made in one or two seasons their investigation will probably be matter of several.

APPENDIX C

SURVEY OF TIDES AND CURRENTS IN CANADIAN WATERS

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This Survey, under the direction of Dr. W. Bell Dawson, F.R.S.C., continues to make important contributions to the knowledge of our tides, both on the Atlantic and Pacific coasts of Canada. The principal tidal stations in the St. Lawrence and on the Atlantic, have been maintained in operation, and some progress has been made in the reduction of the results, as far as means have permitted.

On the Pacific coast, good progress has been made, both in the improvement of the tide tables through the analysis of further tidal record from the principal stations, and also in the establishment of additional tidal stations, to extend the information available. Observations are being continued at Vancouver, and two new stations have been erected, one in Barkley Sound on the outer side of Vancouver Island, and the other at Port Simpson. It may be noted that on the Pacific coast, there is not only a large diurnal inequality, but also an annual variation. Hence, to make satisfactory comparisons, it is necessary either to have six months of continuous observation at any two localities, or to take four months at the four quarters of the year. The stations for which tide tables are calculated are Victoria, in Fuca Strait, and Sand Heads in the Strait of Georgia; and these are well situated for purposes of comparison.

The St. Lawrence.—An important step in advance has been made in the information supplied to aid navigation on the St. Lawrence route. A part of the tidal record from Father Point has been submitted to harmonic analysis which enables tide tables to be calculated directly for that locality. The advantage of this step became apparent from the tidal observations of 1900 on the Lower St. Lawrence; as they showed that both tide and current in the open estuary below the Traverse, could better be referred to Father Point than to Quebec. So far, the Father Point tide tables have been calculated indirectly from Quebec, by means of a double series of variable differences. This elaborate method was devised to save the expense of analysis at an additional station. But it has now been ascertained that the complicated relation between the two places, is chiefly due to the river influence at the upper end of the run of the tide near Quebec; while the tide in the open estuary itself is very irregular. Hence, the tide tables calculated from the analysis, in conjunction with the other data which has been secured, will enable the turn of the strong tidal cur-

rents of the estuary to be readily and accurately known from the tide tables.

Northumberland Strait.—In the present report of progress all the information yet obtained is summarized with regard to the tide and current in Northumberland Strait, and its relation to Cabot Strait, where the Gulf of St. Lawrence opens to the ocean. The levels of datum planes, heights of extreme tide, and the effects of wind disturbance, have also been carefully and fully worked out. These are of primary importance with relation to works of construction in the harbours of the Strait, as well as for uniform reference levels in any future observations.

St. Paul Island is the principal station to which the tides on the south-west side of the Gulf of St. Lawrence and in the region of Northumberland Strait are referred; and comparative observations were taken on the two sides of Cabot Strait, to see whether a sufficiently constant relation could be established with St. Paul Island to enable either of these localities to be used to replace it as a reference station for the regions above referred to. The extreme exposure of St. Paul Island makes the gauge usually liable to accident; and once already it has been carried away, and twice afterwards it was partially wrecked by winter storms.

The endeavour was first made to obtain comparisons with Sydney harbour and Port aux Basques on the two sides. The tide at Sydney has so unusual a character, with large secondary undulations, which are often one-third the height of the main tide, that it was quite unsuitable for comparison with St. Paul Island. After one complete month was secured at Sydney, the gauge was removed to Neil Harbour, a point on the Atlantic side of Cape Breton Island, as near to its northern extremity as practicable. At Port aux Basques the unusual result was found that the two tides of the day are alternately earlier and later than at St. Paul Island when the moon's declination is high. Accordingly, these observations brought out in the clearest light the pre-eminent advantage of St. Paul Island over the other localities in Cabot Strait, as a station to command the whole region under consideration. This advantage must depend largely upon its being situated in deep water; the 100-fathom line being within three miles of the eastern shore of the island, on which the tide gauge is situated. It emphasizes also the importance of choosing strategic points as principal stations, whatever the exposure and the difficulties in maintenance may be, in preference to sheltered harbours where the tide itself is more irregular, owing to the shallower water or greater local interference.

Current in Northumberland Strait.—Observations were taken on the north shore of Pictou Island, which is centrally situated in the

eastern end of this strait. It was found that the variation in the difference of time between the turn of the current and the tide is large; as the turn may take place as much as two hours before high water or after low water. The greater part of the variation follows the change in the moon's declination; as this has been found from the first to be the ruling element in this region. This is very confusing to the mariner, as the turn of the current in relation to the tide is out of accord with the moon's phases, and has thus no fixed relation to the spring and neap tides. The greatest apparent irregularity is when the moon's declination is at its maximum; and this occurs sometimes at the spring tides and sometimes at the neaps. The ordinary navigator takes refuge in the conclusion that the currents are chiefly influenced by the wind. But these observations show that the apparent irregularities can be reduced to definite laws, which although complex, are strictly astronomical in character.

Further observations.—Five summer tidal stations were erected last season with the object of obtaining tidal data as a basis for the investigation of the current at the entrance to the Bay of Fundy, and in the bays on the south coast of Newfoundland. One of these was placed at Trepassey Bay, within sixteen miles of Cape Race, the extreme south-eastern angle of Newfoundland.

Levels and Datum planes.—This survey, as a branch of the Department of Marine, has for its primary object the determination of the time-relations of the tide, and the turn of tidal currents, for the information of mariners. The determination of levels is thus quite collateral to the object which the department has in view, but it was very evident that a large amount of important information could be secured by taking more complete levels, and by establishing bench-marks at all tidal stations at which recording instruments were placed, even for a few months. The additional work involved was therefore undertaken from the outset. Eventually, as the observations are continued, the value of mean sea level, extreme tide levels, and other factors of importance, are determined with reference to this bench-mark. Such factors are of the highest value in city drainage works and harbour improvements. In certain rare instances, bench marks have been established by the Admiralty, which define the lower water datum of the charts. These are always taken advantage of, where they exist. When the height of the tide is referred to this datum level, it shows the depth available in addition to the chart soundings.

A paper has been contributed to the Canadian Society of Civil Engineers, by Dr. W. Bell Dawson, entitled "Tide Levels and Datum Planes in Eastern Canada," in which values for mean sea level are given for Halifax, St. John, and Quebec, based upon several years of

continuous observation in these harbours. The height of extreme high and low water, and other tide levels, are given with reference to bench-marks, for a number of localities along the St. Lawrence, in the Bay of Fundy, and elsewhere. Although there is as yet no general system of levels in Canada, these results are of value locally in the meantime; and they also furnish a basis for any more extended geodetic levelling which may be undertaken.

APPENDIX D

REPORTS OF ASSOCIATED SOCIETIES

REPORTS OF ASSOCIATED SOCIETIES.

I.—From *The Natural History Society of Montreal,* through Prof. T. Wesley Mills.

The Natural History Society of Montreal has the honour of submitting to the Royal Society the following report: The society's work during the past session has been of a very satisfactory character. The meetings have been better attended than usual and the papers read have been of more general interest.

The monthly meetings were as follows :—

1902.

Oct. 27.—"Some of the Mushrooms of Montreal, Edible and Poisonous." (Specimens exhibited.) By the Rev. Robt. Campbell, D.D.

Nov. 24.—"Studies in the Life History of the Sea Urchin." Illustrated with lantern slides.) By Prof. E. W. MacBride, M.A., Sc.D.

1903.

Jan. 26.—"Reptilia of the Island of Montreal." (Illustrated with lantern slides.) By J. C. Simpson, Esq. (of McGill Zoological Laboratory.)

Feb. 19.—"Trematode Parasites of Man and the Other Vertebrates." (Illustrated with lantern slides.) By J. Stafford, M.A., Ph.D., Lecturer in Zoology, McGill University, and Curator of Canada's Marine Zoological Station.

Mar. 30.—"The Lichens of the Island of Montreal." Rev. G. Colborne Heine, M.A.

Apr. 24.—"Native Arsenic discovered in Montreal." Prof. Nevil Norton Evans, M.A.Sc.

"Some Rare Nova Scotia Plants. Rev. Robert Campbell, M.A., D.D.

Seven new members elected.

The donations to the museum were not as numerous as usual. But the contributions to the library were more numerous than ever; so

much so that it is contemplated to use a part of the basement and fit it up as a library and for other purposes.

The visitors to the museum are increasing by leaps and bounds, and it is a matter for regret that we are not in a position to spend more money on it so as to make it more worthy the growing city and a credit to our numerous visitors.

The Somerville Course of Lectures were of a medical character, which, as usual, appealed to good and attentive audiences.

The following is the list:

1903.

Feb. 19.—"General Structure and Functions of the Human Body," by A. T. Bazin, M.D.

Mar. 5.—"Microscopic Structure of the Human Body," by Walter M. Fisk, M.D.

Mar. 12.—"Food and Digestion," by J. L. Day, M.D.

Mar. 19.—"The Blood and Circulation," by A. H. Gordon, M.D.

Apr. 2.—"Senses of Man," by R. A. Kerry, M.D.

Apr. 9.—"Germs in Health and Disease," by J. A. Williams, M.D.

The Saturday afternoon talks to children were as popular as ever. The attendance proves that the subjects chosen have proved acceptable and should be the means of adding to the membership roll of the Society in the future.

The following is the list of subjects and lecturers :—

1903.

Feb. 28.—"Why we Sneeze, Cough, Wink, etc." Wesley Mills, M.D.

Mar. 7.—"Ants and their Ways." J. G. McKergow, Esq.

Mar. 14.—"The Earliest Spring Flowers." Rev. Robert Campbell, D.D.

Mar. 21.—"Plant Fly Traps." Carrie M. Derick, M.A.

Mar. 28.—"Some Sociable People." C. T. Williams, Esq.

April 4.—"Story of a Frog's Life." J. C. Simpson, Esq.

April 11.—"Transportation." George Hodge, Esq.

Saturday afternoon rambles have commenced under the direction of Rev. Robert Campbell, the *Witness* having offered prizes for botany.

Annual excursion to Piedmont well attended, but rained all day which rendered collecting impossible.

Taken as a whole, the year's works may be considered as advancing and satisfactory. But we have to reiterate the fact that the good work is hampered by want of funds and space in the museum and still more so in the library.

The *Record of Science* is still published, and, as far as possible, with original communications. This publication enables us to keep in touch with kindred societies and is the means of adding to the library by exchange.

The following are the present officers:

Patron—His Excellency the Governor-General of Canada.

Hon. President—Lord Strathcona and Mount Royal.

President—E. W. MacBride, M.A., Sc.D.

Vice-Presidents—Frank D. Adams, Ph.D., F.R.S.C.; Rev. Robt. Campbell, M.A., D.D.; B. J. Harrington, Ph.D., F.R.S.C.; A. Holden, J. H. Joseph, Dr. T Wesley Mills, Prof. D. P. Penhallow, Hon. J. K. Ward, Hon. Justice Würtele.

Hon. Recording Secretary—F. W. Richards.

Hon. Corresponding Secretary—J. A. U. Beaudry, C.E.

Hon. Treasurer—Chas. S. J. Phillips.

Hon. Curator—A. E. Norris.

Members of Council—C. T. Williams, Chairman; J. S. Buchan, K.C., B.C.L.; S. Finley, Joseph Fortier, John Harper, Edgar Judge, H. McLaren, J. G. McKergow.

Superintendent—Alfred Griffin.

Mr. Alfred Griffin has proved himself the same efficient and obliging Superintendent as in years past.

II.—From *The Numismatic and Antiquarian Society of Montreal,* through R. W. McLachlan.

The Numismatic and Antiquarian Society of Montreal has the honour to report as follows:—

The delivery of lectures and papers has been interfered with by the important building operations rendered necessary as hereinafter mentioned. However, at the regular meetings of the Society, which were continued in a most interesting manner, and at which were read papers entitled:

1.—"Comments on an unpublished memoir written in 1837 by R. Carter on the miserable state of the currencies of the North American Colonies," by R. W. McLachlan.

2.—"Les Décorations Pontificales," by P. O. Tremblay.

3.—"Comments on an unpublished deposition, made in 1838 by J. B. H. Brien, relating to the later phases of the Rebellion of 1837," by Hon. Justice Baby.

The additions, during 1902, to the Society's collection were:

To the Museum:		
Indian Antiquities	10	
Other Antiquities, mostly Canadian	120	
Coins and medals	20	
		150
To the National Gallery:		
Canadian Portraits	10	
Canadian Views	10	
Canadian Maps	10	
Foreign Views, etc.	90	
		120
To the Library:		
Books, a large part Canadian	1000	
Pamphlets	1500	
Documents	30	
		2530
		2800

A grand total of twenty-eight hundred items. But, besides this the Society has secured on loan a fine collection, numbering over five hundred pieces of Indian antiquities found in the South Western States. Many of them similar to those found in our own North-West.

Last fall the east wall of the Elgin Gallery having been declared to be unsafe, had to be rebuilt. This is no part of the Château de Ramezay proper, but simply an annex, the superstructure of which was built under the administration of Lord Elgin. As this wall was being pulled down by the city's contractors the whole superstructure collapsed, and the Gallery had to be entirely built anew. The accident proved to be by no means an unmixed evil, for the Society has been able to remodel the building so as to make it more conformable to the use to which it was assigned, and now our portrait gallery has a most attractive home; and is one of the best of its kind on the continent of America; with its well on to three hundred portraits of people all in some way or other connected with the history of Canada.

This spring the Council made a demand for the concession of a piece of land in the rear for some civic purpose, offering in exchange a piece on the west side, together with a sum of money for necessary repairs. This exchange has made it necessary the pulling down of another recent annex known as the court room. By this arrangement we expect to remove the library, now occupying the walls of the salon

and other rooms, upstairs which will set free much space for displaying our Canadian veins.

During the last session of our provincial parliament, an amendment was introduced into a bill for revising the charter of the City of Montreal, which, by ordering the removal of all buildings, within certain limits, for the enlargement of the Bonsecours Market, involved the destruction of the Château de Ramezay, as it is well within the area mentioned. As this amendment passed the lower house without much opposition, the Society felt it to be necessary to oppose its enactment as far as the château was concerned. A deputation was therefore sent to Quebec to present the case before the private bills committee of the Legislative Council. This presentation proved so eminently successful, that a clause was inserted in the charter exempting the Château de Ramezay from the proposed market extension.

But the Society deeply regrets to state that a spirit of vandalism is abroad and that there are those who are filled with the desire to tear down anything old and historic simply because it is old; and to erect in its place some hideous modern monstrosity.

The whole incident suggests action in the line of such a law as is in force in many European countries, for the preservation of all important historical monuments; making it a criminal offence to deface or destroy any thing that may be declared to be of national interest. This Society would ask the Royal Society of Canada to take up this matter and have a bill presented to the proper legislative authorities on the lines of the best European law on the subject; and this Society pledges its active support in helping on the good work. If this be not soon done few, if any, historical buildings will be left in this country to save.

The following are the officers of the Society for 1903:

President—Hon. Justice Baby.

Vice-Presidents—R. Roy, K.C.; Judge L. W. Sicotte; W. D. Lighthall, F.R.S.C.; Dr. Louis Laberge, and Chas. T. Hart.

Hon. Treasurer—George Durnford.

Hon. Curator—R. W. McLachlan.

Hon. Recording Secretary—C. A. Harwood.

Hon. Corresponding Secretary—S. M. Bayles.

Hon. Librarian—Gonzalve Desaulniers.

Members of Council—P. O. Tremblay, J. B. Vallée, James Reid, Lewis Skaife, Eugène Lafontaine, K.C.; Ludger Gravel, J. C. A. Heriot, J.W. Domville, and G. N. Moncel.

III.—*Rapport de la Société littéraire de Montréal* par le Rev. J. L. Morin.

Notre Société, qui a terminé ce printemps sa dix-septième année d'existence, continue à rallier dans ses rangs des Canadiens, des Français, des Suisses et même des Anglais qui tous sont dévoués au culte de la langue française et essaient d'en cultiver la littérature.

Pour mieux y réussir on a eu l'idée cette année de changer un peu le programme de nos travaux. Jusqu'ici on choisissait, selon les caprices du sort, deux membres pour lire à chaque séance des études de leur cru et sur des sujets de leur choix, ou quelques pages d'un auteur favori. A cet article de notre programme nous avons ajouté un sujet général, qui doit être traité en collaboration, sur lequel chacun est appelé à exprimer ses opinions personnelles ou à faire connaître celles de quelque autre. Ces sujets généraux sont choisis dès l'automne et inscrits au programme de toute l'année avec les noms de deux ou trois membres qui sont chargés d'ouvrir la discussion.

Victor Hugo nous dit dans *Les Misérables* que quelqu'un s'étant imaginé de substituer la gomme de laque à la résine dans la fabrication des jais anglais, ce tout petit changement opéra toute une révolution dans cette industrie de la petite ville de Montreuil-sur-Mer. La révolution n'a pas été moins grande dans notre société par suite d'un changement de nature différente, mais qui de prime abord ne semble pas plus important.

Grâce à cette modeste innovation, notre petit cénacle s'est livré presque à chaque séance à des discussions générales pleines de vie et d'intérêt, toujours animées d'ailleurs du meilleur esprit. Des voix se sont fait entendre qui, jusqu'alors, étaient restées muettes, et nombre d'entre nous se sont livrés à des études qu'ils n'auraient pas entreprises, n'êut été ce nouveau système.

Il va sans dire que nous comptons y rester fidèles.

Voici quelques-uns de ces sujets dont la discussion a défrayé plusieurs de nos soirées pendant l'hiver d'une manière aussi utile qu'agréable :

1.—Le féminisme a-t-il contribué au bonheur de la femme?
2.—Est-il désirable d'adopter une langue universelle?
3.—Quel rôle joue l'enfance dans la poésie?
4.—Les femmes ont-elles fait preuve de supériorité dans le style épistolaire?
5.—Quels sont les chefs et les principes de l'école parnassienne?
6.—La comédie de mœurs comporte-t elle des enseignements utiles?
Les pays neufs ont-ils une artistocratie?
7.—Appréciation de l'œuvre poétique d'Alfred de Musset.

Les travaux suivants ont aussi été lus devant notre société :
"La Musique en France," par Mad. Cornu.
"Un Conte de Noël," par M. Marc Sauvalle.
"La phonétique," par M. le prof. Walter.
"Etude sur Mad. de Maintenon," M. Morin.
"Alfred de Musset, l'homme et le poète," Mad. Sauvalle.
"Le théâtre, au point de vue moral," M. le prof. Coussirat.
"Les aventures de Lulli," par M. Em. Sandreuter.
"Etude sur Max O'Rell," par M. le pasteur Duclos.
"L'enfance dans la poésie," par M. Robert Smith.
"L'Aristocratie ancienne et nouvelle," par M. le pasteur Lafleur.

IV.—From the *Quebec Literary and Historical Society,* through P. B. Casgrain.

The year just closed has been an uneventful one for the Society.

As recommended by the Council of the preceding year, application has been made to His Honour the Lieutenant-Governor-in-Council for leave to change the rules requiring the stated meetings of the Council and Society to be held at fixed hours, in order that all Council general or annual meetings, may in future be held at such hours as may be found most convenient for the time being.

The finances of the Society are improving. In addition to the generous donation of $100 by Mr. Wm. Price, mentioned in last year's report, we have to acknowledge an offering of $100 from Lt.-Col. F. Turnbull and Mrs. Turnbull and $50 from Mr. Archibald Campbell.

The Society has to deplore the untimely death, amongst others, of two of the oldest associate members, the Hon. R. R. Dobell, whose earnest and cheery voice was more than once heard in our rooms. He was closely followed by his partner, Mr. Thomas Beckett, a firm supporter of our association.

A special meeting was called a few months back to meet our Honorary President, Dr. James Douglas, LL.D., of New York, then on a visit to this city. Dr. Douglas took occasion to urge the Society to continue the publication of some of the invaluable MSS. in our archives, such as was the practice when he had the honour to preside over the Society. He suggested that an appeal be made to Col. Surgeon H. Neilson, grandson of the late Hon. John Neilson, as custodian and proprietor of the valuable Neilson papers; measures have been taken to carry out his views.

Two highly instructive lectures were delivered in the rooms of the Society during the year just expired : Capt. Geo. D. O'Farrell, of the Marine and Fisheries Department at Quebec read a paper "Notes

on the Lighthouses of the Province of Quebec," which was illustrated by photographic views, and Dr. I. P. Whitney, Principal of Bishop's College, Lennoxville, delivered a scholarly lecture. Subject: "A Prophet of Imperialism, Sir John Seely."

A patriotic idea has just taken form and has met with the approval of the Society: indicating to strangers by bronze tablets with suitable inscriptions spots rendered memorable by feats of arms and historical events, such as Sault-au-Matelot street, where Colonel Benedict Arnold was routed on the 31st December, 1775, and Pres-de-Ville, where his chief, Brigadier-General R. Montgomery, met death and defeat on the same day.

The Society is indebted to Major William Wood, Past President, for a copy of Messrs. Doughty and Parmelee's elaborate work on the days of Wolfe and Montcalm, and to Lt.-Col. C. V. F. Townshend, of London, for a handsome copy of the Life and Letters of his distinguished ancestor, Marquis of Townshend, who signed the capitulation of Quebec on the 18th September, 1759.

The Society has to report a large addition of valuable works on history and science on the library shelves, which has materially increased the attendance of members.

The winter course of lectures was duly organized. Mr. J. G. Scott, of the Quebec & Lake St. John Railway, an authority on Canadian railroads, lectured before the Society on: "The Trans-Canada Railway," and the Rev. Frederick George Scott, F.R.S.C., read a paper on Milton.

The financial statement showed the Society to be in a good financial standing.

Officers for the ensuing year:—

President—Sir James M. LeMoine (re-elected).

Vice-Presidents—Messrs. J. Theodore Ross, Peter Johnston, Major W. Wood and Cyrille Tessier.

Treasurer—Mr. James Ceggie.

Corresponding Secretary—Mr. A. Robertson.

Recording Secretary—Mr. J. F. Dumontier.

Council Secretary—Mr. W. Clint.

Librarian—Mr. F. C. Wurtele.

Additional members of Council:—Mr. P. B. Casgrain, Mr. Arch. Campbell, Mr. D. H. Geggie, Mr. Siméon Lesage.

V.—From *The Ottawa Literary and Scientific Society,* through H. H. Bligh.

Having been appointed delegate of the Ottawa Literary and Scientific Society as its representative at the present session of your body, I have the honour to submit the following report:—

During the past year our Society has continued its operations in the usual manner, and although it has not made any conspicuous departure nor added anything very remarkable to its history, the progress has been satisfactory, the work has been continuous and regular, and the results have been sufficient to make us hopeful as to the future.

Some of our members have felt the desirability of increasing the annual contributions to the funds with a view to the enlarging the work and scope of the Society, but up to the present time this advance has not been considered favourably by the majority. It has been contended, not unreasonably perhaps, that such a course would diminish our numbers owing to the inability or unwillingness of some to pay a larger fee, even though this should most certainly ensure larger, better and more satisfactory results. We are, therefore, for want of more funds obliged to continue our operations on practically the old and well established lines, not having the means to enlarge the scope of our efforts to that degree of efficiency and development that the members and friends of our Society most ardently desire.

In addition to our yearly membership fee, I should not forget to mention the handsome grant of four hundred dollars annually from the Ontario Government and also the several considerable donations by prominent gentlemen who in the past have so kindly come to our assistance.

The establishment of a public library in this city which has now become a settled fact, is a matter of most special interest to us as a Society. How far this will interfere with our future success remains to be proved. I have the boldness to submit that it should not interfere in the slightest degree. It may as well be admitted, however, and it would be useless to deny that one of the most conspicuous phases of our Society is its library, and that one of the most prominent features of our library is its lending department. It may, therefore, be hastily argued, that the chief purpose of our Society will be supplied by a public library. I do not hesitate to say in this connection, that no public institution should detract from the interest in and welfare of our Society. Let it be kept in mind that our Society is a private association, and that our library is a private enterprise. Consequently, the difference between a public library and what we offer our members is so real and so clear, that the two objects can never be unified and need never conflict. They are distinct and separate. There is

room for both in the same locality, and I shall be greatly disappointed if we are not able to hold our own in the future as in the past. Instead of being injured or annihilated, or absorbed by the public library, I rather incline to the hope that the directorate of that institution will, if need be, give us their aid and offer us every encouragement, and judging from the personnel of the board of management, one of whom is our worthy librarian, I feel that my hope in this regard is more than justified.

Let me also add, that although we have learned to depend so much on the attractions of our library for increase of membership and sustenance, it is not by any means the only element of our existence or claim to support, and if the time ever comes when our library, from any cause, should receive less attention and consideration than now, we could give more prominence to what may fairly be considered the real functions of a literary and scientific society, that is to say, in the words of one of my predecessors, "Such a Society should stimulate mental activity, original thought and independent research."

Our lecture course for the year was as follows:—

1902.

Nov. 21.—A Study of "The Man from Glengarry," Mr. O. J. Jolliffe, M.A.

Nov. 28.—"Purification of Drinking Water," Mr. A. McGill, B.A., B.Sc., F.R.S.C.

"Original Poem," Mr. W. W. Campbell, B.A., F.R.S.C.

"Primitive Poetry; A Comparative Study," Mr. W. W. Edgar, B.A.

Dec. 12.—"The Development of the Canadian Type of Character," Rev. S. Goldsworth Bland, B.A.

1903.

Jan. 16.—"Social Settlements" (Illustrated), Mr. W. L. M. King, M.A., LL.B.

Mch. 6.—"The Development of Responsible Government in Canada," Mr. W. D. LeSueur, B.A., LL.D.

Mch. 20.—"The Poetry of Matthew Arnold," Mr. Benjamin Russell, LL.D., M.P.

Mch. 27.—"The French Treaty Shore," Prof. Jean C. Bracq (Vassar College.)

The Hon. Chas. Fitzpatrick, K.C., was prevented through pressure of work, from delivering his promised lecture on Lord Russell of Killowen.

Transactions No. 3 for 1901-02 have been recently published, and consists of 97 pages with an introduction by Dr. Morse the President, and the following valuable and interesting papers:—

Metrology—Otto J. Klotz.

Canadian Novels and Novelists—Lawrence J. Burpee.

Modern Types of Danger Warnings on the Sea-Coast—W. P. Anderson.

The Impeccancy of the King—Charles Morse.

These transactions have been distributed to more than 200 societies and public institutions, from which a large number of valuable publications have been received in exchange and added to the library.

The following officers were elected by our Society at its last annual meeting, 24th April, 1903:—

President—H. H. Bligh, K.C., M.A.

1st Vice-President—O. J. Jolliffe, M.A.

2nd Vice-President—Prof. E. E. Prince, F.R.S.C.

Secretary—W. Hague Harrington, F.R.S.C.

Treasurer—A. H. Whitcher.

Librarian—O. J. Klotz.

Curator—Charles Morse, D.C.L.

Committee—W. D. LeSueur, LL.D., Thos. Macfarlane, F.R.S.C., James Ballantyne.

VI.—From *The Ottawa Field Naturalists' Club,* through W. T. Macoun.

The Ottawa Field Naturalists' Club, unlike many scientific organizations which thrive for a short time and then die from lack of enthusiasm among its members, or from some other cause, has been in existence for twenty-four years and is in better condition now than it ever was. With 262 members, a considerable number of whom take an active interest in the club, it has been again possible during the past year to do good work in the various branches of science which the club undertakes to investigate.

Winter Soirées.

Following the custom of other years, soirées were held during the winter months and the programme as arranged was as follows:—

1902.

Dec. 16.—President's Address: "The Functions of a Geological Survey," by Robt. Bell, M.D., LL.D., Sc.D. (Cantab.), F.R.S.
Address of Welcome, by the Principal of the Normal School.

"Some Ottawa Butterflies and Moths," by Dr. James Fletcher, illustrated by coloured lantern slides.

Conversazione, with exhibition of Natural History objects and miscroscopic slides.

1903.

Jan. 13.—"The Scenery of the Rocky Mountain Region," illustrated by lantern slides, by Dr. R. A. Daly, of the Geological Survey.

Report of the Geological Branch.

Jan. 27.—"The Wood-pulp Industry of Canada," by Professor D. P. Penhallow, McGill College, Montreal, illustrated by lantern slides.

Feb. 10.—"Nature Study in American Universities," by Dr. S. B. Sinclair, of the Normal School, Ottawa.

Report of the Entomological Branch.

Feb. 24.—"The Summer Climate of the Yukon and its Effects on Vegetation," by Professor John Macoun, of the Geological Survey.

Report of the Botanical Branch.

Mar. 10.—"Whales and Whale Hunting," illustrated by lantern slides, by Professor E. E. Prince, Commissioner of Fisheries.

Report of the Zoological Branch.

Mar. 17.—(*a*) Annual Meeting. Reports of Council, Election of Officers, etc.

(*b*) "Additional Notes on the Geology and Palæontology of Ottawa," illustrated by lantern slides and specimens, by Dr. H. M. Ami, of the Geological Survey.

All the lectures were delivered as arranged with the exception of the last two. Owing to the illness of Prof. Prince, his place was taken by Mr. Andrew Halkett, who used Prof. Prince's slides. On account of Dr. Ami being absent in England, his lecture was cancelled. The course throughout was very satisfactory and the audiences as a rule were good.

Excursions.

During the spring and summer of 1902, two general excursions were held to Chelsea, P.Q., at which 250 and 200 persons attended. Six spring sub-excursions were arranged for but owing to wet weather only four were held. Several autumn sub-excursions were also made by members of the botanical and entomological branches. At these excursions, addresses were usually given by leaders of the various branches. It is thought that such addresses given in the field, and relating principally to specimens collected, prove very helpful to the members.

Work of the Branches.

The work of the club is divided into seven branches relating respectively to geology, botany, entomology, conchology, ornithology, zoology and archæology, and for each of these branches leaders are appointed every year. These leaders are expected to do most of the field work of the club and to render as much assistance as they can at the excursions to those who are beginning the study of natural history. The botanical and entomological branches have been most active during the past year. Several new species of plants were discovered and many insects. Fortnightly meetings of these branches were held during the winter and are still continuing. These meetings at which many interesting plants and insects have been examined and talked about and work outlined for the future, have proven very enjoyable. Good work was also done during the year by the geological, ornithological and zoological branches. The members of the zoological branch are working especially on the smaller mammalia and fishes.

The Ottawa Naturalist.

In March, 1903, Volume XVI of the Ottawa Naturalist, the official publication of the club was completed. During the year twelve numbers were published containing 248 pages and four plates. Uncoloured copies of the geological map of the city of Ottawa and vicinity were purchased from the Geological Survey Department for distribution with the December number to all Canadian members of the Club. *The Naturalist* was again edited last year by Mr. J. M. Macoun.

The following are some of the more important papers published during the year:

Birds of Sable Island, N.S.; Canadian Hummingbirds, by W. E. Saunders.

Five New Ranunculi; New Northwestern Plants, by Edw. L. Greene.

Marl Deposits of Eastern Canada, by R. W. Ells.

On the Nepheline Rocks of Ice River, B.C.; Dr. Alfred R. C. Selwyn, C.M.G., F.R.S., Director Geological Survey of Canada, 1869-1894, by A. E. Barlow.

On the Genus Arctophila, by Dr. Theo. Holm.

Notes on some Fresh-water and Land Shells; Description of a Fossil Cyrena; On the Genus Trimerella, by J. F. Whiteaves.

Notes on the Arboretum and Botanic Gardens, Central Experimental Farm, by W. T. Macoun.

Notes on some Canadian Birds, by Wm. H. Moore.

Nesting of Some Canadian Warblers (two parts) by Wm. L. Kells.

Field Notes on the Geology of the country about Chelsea, Que., H. M. Ami.

Observations on Animals Native in the Algonquin Park, by Andrew Halkett.

The Educational Value of Nature Study, by A. E. Attwood.

Notes on the Size of Hawks' Eggs, by J. E. Keays.

Contributions to Canadian Botany No. XVI, by James M. Macoun.

Ottawa Satyrinæ, A. E. Richard.

Besides these there are numerous short papers on scientific subjects, reports of soirées and excursions and of the work done by the various branches of the club, and reviews of scientific books.

At the annual meeting of the club held in March, 1903, the following officers were elected for 1903-1904:

Patron—The Right Honourable Earl of Minto, Governor-General of Canada.

President—W. T. Macoun.

Vice-Presidents—A. E. Attwood, M.A., Andrew Halkett.

Librarian—S. B. Sinclair, B.A., Ph.D.

Secretary—W. J. Wilson, Ph.B. (Geological Survey Dept.).

Treasurer—A. Gibson (Central Experimental Farm).

Committee—Dr. Jas. Fletcher, Mr. W. H. Harrington, Mr. F. T. Shutt, Miss M. McK. Scott, Miss A. Matthews, Miss R. B. McQueston.

Auditors—J. Ballantyne, R. B. Whyte.

Standing Committees of Council—Publishing—J. Fletcher, Miss M. McKay Scott, F. T. Shutt, W. J. Wilson, A. E. Attwood.

Excursions—S. B. Sinclair, Andrew Halkett, W. J. Wilson, A. Gibson, Miss Ruby B. McQueston, Miss Annie L. Matthews.

Soirées—W. H. Harrington, J. Fletcher, A. E. Attwood, Andrew Halkett, Miss M. McKay Scott, Miss Ruby B. McQuesten.

Leaders—Geology—H. M. Ami, W. J. Wilson, O. E. LeRoy.

Botany—J. M. Macoun, C. Guillet, D. A. Campbell, A. E. Attwood, S. B. Sinclair.

Entomology—J. Fletcher, W. H. Harrington, C. H. Young, A. Gibson.

Conchology—J. F. Whiteaves, R. Bell, F. R. Latchford, J. Fletcher.

Ornithology—John Macoun, A. G. Kingston, C. Guillet, Miss G. Harmer.

Zoology—E. E. Prince, Andrew Halkett, W. S. Odell.

Archæology—T. W. E. Sowter, J. Ballantyne.

VII.—From *Hamilton Scientific Association,* through Rev. D. B. Marsh.

The Hamilton Scientific Society takes pleasure in presenting the following report:

During the session just closed papers were read before the general Association on the following subjects:—

1.—In his inaugural address the President, Mr. J. M. Dixon, treated of the "recent advancement made in chemical and physical science."

2.—"Wireless Telegraphy," by Dr. Merchant, of London Normal School.

3.—"Reminiscences of Nome and Romance of Placer Mining," by Mr. E. C. Murton, of Hamilton.

4.—"The Mackenzie River District," by J. W. Tyrrell, C.E., D.L.S., of Hamilton.

5.—"Education versus Educational Theory," by S. A. Morgan, B.A., D. Paed., of Hamilton.

Twenty new members were added during the year and the Association is in a most flourishing condition. Our youngest section, the Astronomical Society, Adam Brown, Esq., honorary president; Rev. D. B. Marsh, B.A., Sc.D., president and founder, has been most active, having held fifteen meetings at which papers were read, of which the following are some :—

"Weather Forecasts," by R. F. Stupart, F.R.S.C., Director of Meteorological Bureau, Toronto.

"Kelvin's theory of Ether as applied to the Stellar Universe," by Mr. J. R. Collins, Toronto.

"The Moon," by G. P. Jenkins, F.R.A.S., of Hamilton.

"Determining the length of light waves," by Professor C. A. Chant, M.A., Ph.D., of Toronto University.

"The Planet Jupiter," by Rev. R. E. Brady, Hamilton.

"The Determination of Time and the Transit Instrument," by Mr. F. L. Blake, O.L.S., D.L.S., Toronto.

"Looking Up and Looking Down," by Mr. J. M. Williams, Hamilton.

"The Planet Saturn," by Mr. William Bruce, Hamilton.

"The Planet Neptune," by Rev. Dr. Marsh, Hamilton.

"Is the Moon a Dead World?" by Mr. J. E. Maybee, F.R.S.C., Toronto.

The attendance of the public at these meetings has been most encouraging and this section has done decidedly good work.

The Camera Section, Mr. James Bertram, president, continues to do active work. On May 24th last, the club held a pleasant outing to the Forks of the Credit. The members were divided in groups during the year, A. B. C. D. for the purpose of competition. The club contributed to the American Lantern Slide Exchange, a large and very fine set of slides. An annual exhibition and competition was held in March and was most successful. Frequent meetings were held at which the attendance was large. The membership has continued to increase and interest in the work of the club is sustained.

The Geological Section has quietly continued its good work of past years in the collection and distribution of fossils, and though small in numbers, its work is most permanent in character.

VIII.—From the *Entomological Society of Ontario,* through the Rev. C. J. S. Bethune, D.C.L.

In giving a report of the doings of the Entomological Society of Ontario for the past year—the thirty-ninth since its foundation—it will not be necessary to recount the various forms of work undertaken by its members, as these were fully described last year and no important changes have since been made in its methods of procedure. It will be sufficient to give some particulars respecting its publications and a brief account of the annual gathering of its members at the headquarters in London.

The "Canadian Entomologist," the monthly magazine of the Society, is now in its 35th year of publication. The volume for 1902 contains 339 pages, and is illustrated with three full-page plates and twelve figures from original drawings. The contributors number forty-seven and represent Canada, the United States, Germany and Russia. The principal articles may be grouped as follows :—Descriptions of new genera, species and varieties in Lepidoptera by Prof. J. B. Smith, Dr. H. G. Dyar, Mr. Henry Bird, Prof. A. R. Grote and Mr. A. G. Weeks; Orthoptera by Messrs. E. M. Walker, A. N. Caudell and J. A. G. Rehn; Hymenoptera by Prof. T. D. A. Cockerell, Messrs. W. H. Ashmead, E. S. G. Titus, Charles Robertson, J. C. Crawford, W. H. Harrington, H. L. Viereck, and J. C. Bradley; Hemiptera-Homoptera by Prof. T. D. A. Cockerell, Messrs. E. D. Ball, G. B. King and E. M. Ehrhorn; Neuroptera by Prof. J. G. Needham and Mr. N. Banks; Coleoptera by Prof. H. F. Wickham, and Mr. W. D. Pierce; Diptera by Messrs. D. W. Coquillet and C. W. Johnson, and Prof. Cockerell; and Acarina by Mr. N. Banks. Forty-one new genera are described, 176 new species and 12 new varieties and subspecies.

Papers on Classification and Systematic Entomology; Notes on Lepidoptera by Mr. H. H. Lyman, Dr. H. G. Dyer, Professors Grote and J. B. Smith, and on the genus Catocala by Prof. G. H. Frendh; the Wasps of the Super-family Vespoidea by Mr. W. H. Ashmead; Ontario Acrididæ by Mr. E. M. Walker; Cocidæ by Mrs. Fernald; Bombidæ by Prof. Cockerell; Halictinæ by Mr. C. Robertson; Orthoptera by Mr. J. A. G. Rehn; and an article on the scientific name of the Cherry Fruit-fly by Prof. M. V. Slingerland.

Life histories are given with more or less completeness of the following insects: The Variable Cut-worm (*Mamestra Atlantica*), by Dr. Fletcher and Mr. A. Gibson; *Arctia virgo* and *phalerata* and *Penthina hebesana* by Mr. Gibson; several species of Hydrœcia, illustrated by a beautiful coloured plate, by Mr. Henry Bird; *Lycœna Scudderii* by Mr. H. H. Lyman; *Corethra Brakeleyi* by Prof. J. B. Smith; *Lyda fasciata* by Mr. R. F. Pearsall; the egg of the Water-scorpion (Ranatra), by Mr. R. H. Pettit; and the larva of a Datana by Dr. Kunze. Collecting notes, containing observations of much interest, are given by Mr. E. F. Heath on Manitoban Lepidoptera; Mr. W. H. Harrington on Coleoptera; Mr. E. D. Harris on Cincindelidæ; Mr. Geo. B. King, on Coccidæ and the Rev. Dr. Fyles records the capture near Quebec of a Tortoise beetle new to Canada.

Among the miscellaneous papers may be mentioned a discussion on Labels for specimens; "What is a genus?" by Mr. H. H. Lyman; "The Formation of Generic Names," by Prof. J. M. Aldrich; "The Ecology of Insect Sounds," by Mr. Frank E. Lutz; and an account of the changes in the Insect Fauna of Northern Illinois, by Prof. F. M. Webster.

The thirty-ninth annual meeting of the Society was held in London at the end of October last. Its proceedings were opened by a conference on the Destructive Pea-weevil which has caused an immense amount of loss in the Province of Ontario during the last few years. The discussion was opened by Dr. Fletcher, who gave a full description of the insect and the ravages it commits, its distribution and the best methods of controlling it; other speakers were Prof. Lochhead, Mr. Pearce, Mr. Fisher, and Prof. James, Deputy Minister of Agriculture for Ontario. Resolutions were adopted regarding the diffusion of information among the community and requesting the Provincial Government to send a competent staff of men to the rural districts of the country whose duty it should be to give the farmers practical lessons in the best methods of eradicating the pest.

Mr. George E. Fisher, the Provincial Inspector of Scale Insects, gave a report on the insects of the year in the Niagara and Hamilton

districts, and described his experiments with the lime and sulphur wash for the destruction of the San José scale, and their successful results.

At a public meeting in the evening the Rev. Dr. Fyles read his presidential address on "Insect Life," illustrated by a series of beautiful coloured diagrams that he had himself prepared; and Prof. Lochhead gave a lantern lecture on "Some noted Butterfly-hunters and some common Butterflies."

The proceedings at the several sessions of the meeting and the papers read are given in full in the thirty-third Annual Report of the Society, which was published by the Ontario Department of Agriculture in March last. It consists of 132 pages illustrated with 108 engravings in the text and photogravure portraits of Mr. E. Baynes Reed, one of the original members of the Society and for many years one of its most active officers, and of Mr. W. E. Saunders the present energetic Secretary. Reports are given from the various officers and sections and the branches at Montreal, Quebec and Toronto, and also from the North-West (Canada) Entomological Society.

Among the papers read may be mentioned the valuable reports on the insects of the year in their districts by the directors, Messrs. C. H. Young, Ottawa; J. D. Evans, Trenton; E. M. Walker, Toronto; G. E. Fisher, Hamilton and Niagara; and J. A. Balkwill, London. These are supplemented by further notes on the season by Messrs. C. Stevenson, J. A. Moffatt, Prof. Lochhead and Dr. James Fletcher. Mr. Lyman contributed a paper on the remarkable habits of the Archippus butterfly and the points in its history on which further information is required. Dr. Fyles furnished an article on the Paper-making Wasps of Quebec; Mr. A. Gibson on "Some interesting habits of Lepidopterous larvæ," and an account of *Semiophora Youngii,* a new enemy of tamarac and spruce trees; Mr. Harrington, "Notes on Insects Injurious to Pines;" Prof. Lochhead an illustrated "Key to Orchard Insects;" Mr. Moffat, "A Talk About Entomology;" and Dr. Fletcher and Mr. Harrington the very valuable "Entomological Record for 1902.'

Officers for 1902-1903.

President—Professor William Lochhead, B.A., M.S., Ontario Agricultural College, Guelph.

Vice-President—J. D. Evans, C.E., Trenton.

Secretary—W. E. Saunders, London.

Treasurer—J. H. Bowman, London.

Directors—Division No. 1—C. H. Young, Hurdman's Bridge.
Division No. 2—C. E. Grant, Orillia.

Division No. 3—E. M. Walker, M.A., Toronto.
Division No. 4—G. E. Fisher, Freeman.
Division No. 5—J. A. Balkwill, London.

Directors Ex-officio—(Ex-Presidents of the Society)—Professor Wm. Saunders, LL.D., F.R.S.C., Director of the Experimental Farms, Ottawa; Rev. C. J. S. Bethune, M.A., D.C.L., F.R.S.C., London; James Fletcher, LL.D., F.R.S.C., F.L.S., Entomologist and Botanist of the Experimental Farms, Ottawa; W. H. Harrington, F.R.S.C., Ottawa; John Dearness, Normal School, London; Henry H. Lyman, M.A., F.R.G.S., F.E.S., Montreal; Rev. T. W. Fyles, D.C.L., F.L.S., South Quebec.

Librarian and Curator—J. Alston Moffat, London.

Auditors—W. H. Hamilton and S. B. McCready, London.

Editor of the Canadian Entomologist—Rev. Dr. Bethune, London.

Editing Committee—Dr. J. Fletcher, Ottawa; H. H. Lyman, Montreal; J. D. Evans, Trenton; W. H. Harrington, Ottawa; Professor Lochhead, Guelph.

Delegate to the Royal Society—Rev. Dr. Bethune, London.

Delegates to the Western Fair—J. A. Balkwill and W. E. Saunders, London.

Committee on Field Days—The Chairmen of the Sections and Dr. Woolverton, Messrs. Balkwill, Bowman, Law, Moffat, Rennie and Saunders, London.

Library and Rooms Committee—Messrs. Balkwill, Bethune, Bowman, Dearness, Moffat, and Saunders, London.

IX.—From the *Natural History Society of New Brunswick,* through Hon. J. V. Ellis.

On behalf of the council and members of the Natural History Society of New Brunswick, I have the honour to present the following report:—

The work of this Society, during the year 1902-03, has been characterized with considerable vigour, especially along the lines of original investigation, in which some very satisfactory results have been attained.

The main lines upon which the work of the Society has been carried on are as follows: (1) Investigations of its members in the various departments of work; (2) Lectures during the winter months on subjects based on the results of these investigations; (3) The publication of an Annual Bulletin, in which original papers and the results of these researches are published; and (4) Supplementary work of a more ele-

mentary and popular character during the winter, such as a course of elementary lectures designed for young people, a course of afternoon lectures, under the auspices of the Ladies' Association; and the opening of the Society's museum during three afternoons of each week during the year for general visitors and the instruction of the pupils of the public schools.

The enrolled membership of the Society is 170, embracing all classes of members. A modest income derived from the fees of members, interest on an investment, and a small yearly grant from government is sufficient for the current expenses of the Society.

Ten regular meetings have been held during the year at which the following papers were read:

1902.

June 3.—"Reports of the Meeting of the Royal Society at Toronto," by G. U. Hay and G. F. Matthew.

Oct. 7.—"Batrachians of the Carboniferous Age and their Tracks at the Joggins mines, N.S.," by G. F. Matthew, D.Sc.

Nov. 4.—"Mushrooms; their Structure, Habits and Uses (to be followed by a list)," by G. U. Hay, D.Sc.

Dec. 2.—"Notes on the Geology of the Northern Highlands of New Brunswick," by Prof. L. W. Bailey, Ph.D.

1903.

Jan. 6.—(*a*) "The Parasite," Geo. G. Melvin, M.D.
(*b*) "Some Rare Plants and their Habits," H. F. Perkins, Ph.B.

Jan. 20.—Annual Meeting. President's Address. Election of Officers.

Feb. 3.—(*a*) "The Borderland between Insanity and Crime," Hon. H. A. McKeown, M.P.P.
(*b*) "Notes on New Brunswick Fishes," Chas. F. B. Rowe.

Mar. 3.—(*a*) "Wintering of Plants," J. Vroom.
(*b*) "Notes on the Violets," J. Vroom.

April 7.—"The Structure of the Common House Fly," W. H. Mowatt.

May 5.—(*a*) "Birds and their Structure," A. Gordon Leavitt.
(*b*) "Birds and their Nests," J. W. Banks.

In addition to the above a valuable series of papers was contributed by Prof. W. F. Ganong on the "Physiography and Natural History of New Brunswick."

The elementary course embraced talks and discussion on minerals, plants, birds and insects.

The Thursday afternoon lectures before the Ladies' Association proved of great interest and attracted large audiences. The following were the subjects treated and the lecturers:

1903.

Jan. 15.—"Thoreau," Mrs. E. S. Fiske.
22.—"Reminiscences of the American Museum," Mrs. G. F. Matthew.
29.—Children's Day. "A Talk on Insects," Mr. Wm. McIntosh.

Feb. 5.—"Wordsworth; A Nature Poet," Mrs. G. A. Hamilton.
12.—"Colour in Nature," Miss A. Jack.
19.—"A Prehistoric Mound in Ontario," Miss A. L. Hunt.
26.—Children's Day. "A Talk on Birds," Mr. A. Gordon Leavitt.

Mar. 5.—"The Scientific Basis of Art," (illustrated), Miss M. Barry Smith.
12.—"A Ramble in Switzerland," Miss Christine Matthew.
19.—"Nature Study in the Public Schools," Miss G. Murphy.
26.—Reunion of Members.

The following are the officers and committees of the Society for the present year:

Patron—His Honour the Lieutenant-Governor, Honourable J. B. Snowball.

Council for 1903—President, Hon. J. V. Ellis, LL.D.; Vice-Presidents, G. F. Matthew, H. G. Addy, M.D.; Treasurer, A. G. Leavitt; Secretary, G. U. Hay, D.Sc.; Librarian, W. L. Ellis, M.D.; Curators, S. W. Kain, J. W. Banks, Wm. McIntosh; Additional Members, J. Roy Campbell, James A. Estey, W. F. Hatheway.

Associate Members' Branch—President, Mrs. G. F. Matthew; Vice-Presidents, Mrs. G. U. Hay, Mrs. H. G. Addy; Secretary-Treasurer, Miss Edith McBeath.

Standing Committees—Archæology, S. W. Kain, Dr. A. C. Smith, Miss Jack; Botany, G. U. Hay, Prof. W. F. Ganong, John Brittain, James Vroom; Entomology, Wm. McIntosh, A. G. Leavitt; Finance, A. G. Leavitt, J. Roy Campbell, W. F. Hatheway; Geology, Dr. G. F. Matthew, Prof. L. W. Bailey; Lectures, Dr. G. U. Hay, Dr. H. G. Addy, Dr. G. F. Matthew; Library, Dr. G. U. Hay, Wm. McIntosh, Dr. W. L. Ellis, Mrs. G. U. Hay, Mrs. W. F. Hatheway, Mrs. G. A. Hamilton; Microscopes, Dr. W. L. Ellis, Dr. G. G. Melvin, W. H. Mowatt; Ornithology, A. G. Leavitt, Wm. White, J. W. Banks; Press, G. U. Hay, A. G. Leavitt, Wm. McIntosh; Publications, Dr. G. F. Matthew, S. W. Kain, G. U. Hay, A. G. Leavitt; Rooms, Dr. H. G. Addy, Mrs. G. F. Matthew, Mrs. G. U. Hay, Mrs. W. S. Hall.

Among the progressive measures that the Society has in view for the ensuing year are the following: (1) A scheme of affiliation by which natural history societies now in existence, and which may in future be formed in the province, may affiliate with the Natural History Society of New Brunswick as the parent society; (2) to join heartily in the movement to celebrate the ter-centenary of Champlain's discovery of St. John, and invite the Royal Society of Canada to meet here on that occasion; (3) to conduct a summer camp, or hold field meetings in places where profitable and interesting work may be carried on; (4) to urge upon the New Brunswick Government the desirability of marking the bounds and laying out the park and game preserve in the Tobique-Nepisiguit region.

The Annual Bulletin which the Society has just issued, and which I have the honour to present to the Royal Society, contains a very full record of the results of the original work carried on by the Society during the year.

X.—From the *Nova Scotian Institute of Science,* through Dr. R. W. Ells.

The Nova Scotian Institute of Science, through its delegate, begs to submit to the Royal Society of Canada, a report on its proceedings during the past session of 1902-3.

The following were elected officers for the year 1902-3:—

President—Henry S. Poole, Esq., A.R.S.M., F.G.S., F.R.S.C. *ex-officio* F.R.M.S.

1st Vice-President—F. W. W. Doane, Esq., C.E.

2nd Vice-President—Prof. E. McKay, Ph.D.

Treasurer—W. C. Silver, Esq.

Corresponding Secretary—A. H. MacKay, Esq., LL.D., F.R.S.C.

Recording Secretary—Harry Piers, Esq.

Librarian—Harry Piers, Esq.

Other Members of Council—M. Bowman, Esq., B.A.; W. L. Bishop, Esq.; Martin Murphy, Esq., D.Sc.; W. McKerron, Esq.; Prof. S. M. Dixon, B.A., B.A.I.; Edwin Gilpin, Esq., LL.D., F.R.S.C.; Alex. McKay, Esq.

Auditors—Roderick McColl, Esq., C.E., and J. B. McCarthy, Esq., B.Sc.

Parts 3 and 4 of volume X. of the proceedings and transactions have been published and distributed during the year.

The King's County branch of the Institute, Wolfville, N.S., organized May 29, 1901, under the presidency of Prof. E. Haycock,

of Acadia College, has been actively working during the session and a number of papers were read at its various meetings.

Meetings were held from November until May, 1903. The following papers were communicated during the session:—

1.—"Presidential Address," by A. H. MacKay, Esq., LL.D., F.R.S.C.

2.—"Middleton Fungi, with general Remarks," by R. R. Gates, Esq., of Mt. Allison University.

3.—"Nova Scotian Fungi," by A. H. MacKay, Esq., LL.D.

4.—"Guns and Gunnery," by Major English, R.A.

5.—"The Swim Bladder of Fishes, a Degenerate Gland," by Prof. E. E. Prince, Commissioner and General Inspector of Fisheries, Ottawa.

6.—"Colours of Animals, their nature and meaning," by Prof. E. E. Prince, Ottawa.

7.—"The Meso-Carboniferous Age of the Union and Riversdale Formations of Nova Scotia, and their equivalents the Mispec and Lancaster Formations of New Brunswick," by Henry M. Ami, Esq., D.Sc., Ottawa.

8.—"Note on *Dictyonema websteri*," by Henry S. Poole, Esq., F.G.S., F.R.S.C.

9.—"Exhibition and description of three abnormal specimens recently received at the Provincial Museum," by Harry Piers, Esq., Curator Provincial Museum.

10.—"The Mira Grant," by Edwin Gilpin, Jr., Esq., LL.D., F.R.S.C., Inspector of Mines.

11.—"The Yellowstone National Park," by Prof. J. E. Woodman, D.Sc., School of Mining and Metallurgy, Dalhousie College.

12.—"Note on a Lichen-mimicking Caterpillar," by C. B. Robinson, Esq., B.A., Pictou Academy.

13.—"Wireless Telegraphy," by Parker R. Colpitt, Esq., City Electrician.

14.—"Is there Coal under Prince Edward Island," by Henry S. Poole, Esq., F.G.S., F.R.S.C.

15.—"Geology of Moose River Gold District, Halifax County, N.S.," by Prof. J. E. Woodman, D.Sc., School of Mining and Metallurgy, Dalhousie College.

16.—"Analyses and Sections of Nova Scotian Coals," by Edwin Gilpin, Jr., Esq., LL.D., F.R.S.C., Inspector of Mines.

17.—"Phenological Observations, Canada, for 1902," by A. H. MacKay, Esq., LL.D., F.R.S.C.

18.—"Botanical Notes," by A. H. MacKay, Esq., LL.D.

19.—"Distribution of *Fucus serratus* in Nova Scotia," by C. B. Robinson, Esq., B.A., Pictou Academy.

The following papers were brought before the King's County branch of the Institute during the session:—

1.—"Objects and Aims of the King's County Branch of the N.S. Institute of Science," by Prof. Ernest Haycock, Acadia College, Wolfville.

2.—"Principles of the Dynamo," by Prof. F. R. Haley, Acadia College.

3.—"Modern Systems of Electric Lighting," by D. R. Munro, Esq.

4.—"Adolph Loring and his specialty," by A. DeW. Barss, Esq., M.D.

5.—"Coastal Erosion at Long Island, King's County, N.S.," by Prof. E. Haycock.

6.—"Ice-borne Sediment in Minas Basin, N.S.," by J. A. Bancroft, Esq.

7.—"Teaching Material in Mineralogy recently added to Acadia College equipment," by Prof. E. Haycock.

8.—"The Life History of the Bud Moth," by Prof. F. C. Sears, N.S. School of Horticulture.

XI.—From the *Nova Scotia Historical Society*, through the Hon. J. W. Longley.

This Society has had a flourishing season, no less than six papers on important historical topics having been read, as follows:

November.—"Hon. Alexander Stewart," by Hon. Judge Townshend.

December.—"Voyages of John Cabot," by Hon. Senator Poirier.

January.—"Halifax during the Revolutionary War," by Miss Emily Weaver.

February.—"Howe as an Imperialist," by F. Blake Crofton, Esq.

March.—"Journalism in the Maritime Provinces," by D. R. Jack, Esq.

April.—"Mr. John Wiswall," by Rev. E. M. Saunders, D.D.

The ter-centennary of the settlement of Port Royal is to be celebrated in 1904 at Annapolis Royal, the arrangements for which have been entrusted to this Society. Invitations are to be sent to the governments of Great Britain, United States, France and Canada, to participate in this celebration, and to all historical societies in Canada and the United States.

The officers of the Society for the year are:

President—Hon J. W. Longley, F.R.S.C.

Vice-Presidents—Hon. L. G. Power, Hon. Judge Townshend, A. H. McKay, LL.D.

Corresponding Secretary—F. Blake Crofton, Esq.

Recording Secretary—W. L. Payzant, Esq.

Treasurer—R. J. Wilson, Esq.

Council—J. J. Stewart, Esq.; A. McMechan, Ph.D.; Rev. Dr. Saunders, and A. Frame, Esq.

XII.—From the *Elgin Historical and Scientific Institute,* through Dr. S. E. Dawson.

This being the centennial year of the Talbot settlement, the members have been chiefly engaged in preparing for the celebration to be held in St. Thomas, May 21st to 25th inclusive.

The co-operation of the citizens generally has been secured and a general committee formed, with the Mayor of the city as chairman.

The chief event of the 21st of May, the day Colonel Talbot, the founder of the settlement, landed at Port Talbot, will be a banquet, to be held at the Grand Central Hotel in St. Thomas, under the auspices of the Institute, to which all members of the Dominion and Provincial Parliaments who represent any part of the original settlement, wardens of counties, and mayors of cities and towns within the same area are invited, as well as the councils of the county of Elgin and city of St. Thomas, and other guests.

Subsequent days will be devoted to the opening of a new collegiate institute and armouries, pioneer and military processions, old boys' gathering, band concerts, illuminations, etc., and the erection of a cairn composed of stones representing each of the 29 townships embraced in the original settlement, to be placed in position by the reeves and engraved with the names of the townships. This cairn is intended to form a permanent historical feature in the recently acquired municipal park of St. Thomas. On the intervening Sunday, sermons appropriate to the occasion will be preached in all the churches. About 1,000 militia from Toronto, Chatham and St. Thomas take part in the celebration.

On June 3rd and 4th, the Ontario Provincial Historical Society hold their annual meeting at St. Thomas, when a drive to the Southwold Earthworks and Port Talbot form part of the programme.

The Ladies' branch has been active as ever and has planned a celebration in connection with the centennial celebration in St. Thomas, one interesting feature of which will be the entertainment of a gathering of the octogenarian ladies of the settlement. At the numerous meetings of the branch the following among other papers have been read:

Papers on the six pioneer families of the Talbot Settlement.

Papers on the different denominational churches.

Papers on Governor Simcoe, Laura Secord, M. de Verchères.

The chief work accomplished by the Society during the past year is the refitting of their vast and commodious apartments. They are handsomely and tastefully decorated and can compare favourably with any rooms of the same nature in the province.

The officers of the Ladies' Auxiliary are:

President, Mrs. J. H. Wilson; 1st Vice-President, Mrs. James H. Coyne; 2nd Vice-President, Mrs. O. Shea; Secretary, Mrs. S. Silcox; Assistant Secretary, Charlotte S. Wegg; Corresponding Secretary, Mrs. E. W. Gustin; Treasurer, Mrs. E. H. Caughell; Assistant Treasurer, Miss F. McLauchlin.

Elgin Historical and Scientific Institute officers:

President—C. O. Ermatinger, Esq.

Vice-President—S. Silcox, B.A., D.Paed.

Secretary-Treasurer—W. H. Murch, Esq.

Assistant Secretary, Charlotte S. Wegg.

Curator—Mrs. St. Thomas Smith.

Editor—Frank Hunt, Esq.

Council—Mrs. Gustin, Mrs. Cormack, Mrs. Griffin, Mrs. Jackson, Mrs. Wilson, Mr. Oakes, Mr. Coyne, Mr. McKay, Mr. Stewart.

XIII.—Report of *The Manitoba Historical and Scientific Society,* through the Rev. Dr. G. Bryce.

The Manitoba Historical and Scientific Society has now entered upon the 25th year of its history. During this quarter of a century, while it has witnessed the marvellous settlement of the province and remarkable growth of the city of Winnipeg, it has also sought to preserve the records and doings of the unique civilization which grew up under the care of the fur companies, to examine the ethnology of the Indian races of the west and to link harmoniously the new with the old.

Its arrangement with the city of Winnipeg by which it co-operates with the city in managing the Public Library and in opening its fine Reference Library of 10,000 volumes for the use of the citizens, still continues. At present the quarters are in the City Hall.

During the past year, however, the city has purchased a suitable site for the new Carnegie Library, and during the present month accepted tenders for the erection of a commodious and handsome building. This building to be erected at once will supply excellent accommodation now denied in the City Hall.

The Society has during the past year had a number of papers read by its members, among the more important being an elaborate account by retired Chief Trader McLean, of the Hudson's Bay Company, of the

celebrated captivity of himself and his family for a number of weeks by the Fort Pitt Indians under Chief Big Bear in 1885. This will no doubt be published and will supply an interesting and comprehensive account of that portion of the North-West Rebellion.

Another paper of importance was a collection of letters (1821-55) found in New York State, of the late Sheriff Alexander Ross, one of the original landholders of Winnipeg and whose family names are to be seen in a number of the names of Winnipeg streets to-day. A valuable paper on the "Perching Birds," of the neighbourhood of Winnipeg was also read before the Society. In this connection it may be said that a Natural History Society has been started with much energy which will develop more fully that side of the society's work.

In the printed annual report of the Society for the year, the practice is followed of giving short biographical sketches of members of the Society, or old settlers of note of the country, who have passed away. One of the most noted of this year is that of a past president of the Society, the late William Cowan, M.D., a distinguished Scottish physician, who some forty years ago came in the service of the company to the posts on Hudson Bay. On being removed to the interior Dr. Cowan was given the important position of Master of Fort Garry. He was occupying this position in 1869, when Louis Riel, with his Metis followers seized Fort Garry. Dr. Cowan was a man of high character, of excellent parts, and held the respect of all the people. He was one of a sturdy band of traders fast passing away—not we fear to have successors of the same type.

In the enormous growth of the city, the Society is keeping in view the preservation of such memorials of the past as can be spared, and looks forward to decorating the eight or ten parks scattered through the city for which it is becoming famous, by busts or when possible, statues of such men as Sieur de la Verendrye, Sir A. Mackenzie, Lord Selkirk, Sir Geo. Simpson and others who have been famous in the history of the North-West. The finances of the Society it may be stated are in excellent condition.

XIV.—From the *Royal Astronomical Society of Toronto*, through R. F. Stupart.

At the twelfth annual meeting of the Society, which was well attended, the retiring President for the former year, G. E. Lumsden, F.R.A.S., delivered an address entitled, "Astronomical Notes of the past year in which he referred to observations of Nova Persei, the new star that had been first observed by Dr. Anderson, of Edinburgh, to blaze out in the constellation Persius in February, 1901. The star

though faint, was still visible in a large telescope and the character of the nebula that surrounded it presented problems not easy for the theoretical astronomer to solve. Allusion was also made to the sun, including the results of the observations of the total eclipse on the 18th of May; to the continued discovery of asteroids, and to the work which had been done upon Eros; to the Leonid showers of meteors, which, though not seen to advantage in Toronto, had evidently been well observed at Winnipeg and at Echo Mountain, California; to the Cape Comet, the brightest which had appeared since 1882, to Encke's Comet; to the success achieved at Flagstaff Observatory in photographing the Zodiacal Light; to the synchronism of auroral displays at the north and south poles, and to the investigations of Prof. R. A. Fessenden, in regard to Gravitation.

Referring to this, Mr. Lumsden said Prof. J. J. Thomson was able to show, *Philosophical Magazine,* April, 1881, that electrical charges increased the *inertia* of bodies. And, in *Phil. Mag.*, Dec., 1899, that, under special conditions the atom could, apparently, be split up into numerous parts called "corpuscles," the number in the hydrogen atom being of the order of at least 1000, and the corpuscles were electrically charged. With these two experimental results before him, Thomson then undertook a mathematical investigation to determine whether the "corpuscular" charges would be sufficient to account for the entire inertia of bodies, but was unable to make out corpuscular spaces and surfaces enough to accommodate more than a portion of the requisite charges. Here, Prof. Fessenden took up the work, and assuming the corpuscles to be vortices of a special form and orientated in a special way, appears to have found surfaces and spaces enough for electric charges sufficient to account entirely for the property known as "inertia" of bodies; at the same time, he undertook to show that these minute corpuscular charges would produce a change of density of the ether surrounding each particle, an effect akin to, though differing from, a magnetic "field" extending outward indefinitely in all directions and decreasing inversely as the square of the distance—producing, in a word, the effect known as gravitation, the velocity of which would be many times greater than that of light, viz., 10^{30}, but it may be asked, Does not an electric charge need to be explained itself? Recent investigations along these lines seem to point towards the conclusion that an electric charge, apparently, consists of a specialized strain, tension or pressure of the ether that may be isolated or stored on the surface of bodies or the particles of which bodies consist, the energy of which strain cannot be communicated to the normal ether except it be in a special condition.

Mr. Lumsden also made reference to a communication from Mr. G. W. Ritchey, optician at the Yerkes' Observatory, on the subject of constructing large telescopes, chiefly for photographic work. Mr. Ritchey looked forward to the construction in the near future of a large reflecting telescope ten or twelve feet in aperture. Such an instrument, of fifty or sixty feet focal length, could, he contended, now be successfully made, "without the slightest danger of failure," which, in a fine climate, would give results immeasurably beyond any attainable at present, adding that "in many kinds of work the two-foot reflector (of the Yerkes Observatory) usually surpasses the forty-inch refractor." This being so, he asked, "What would a ten or twelve foot do?"

At the meeting of January 15th, J. A. Brashear, F.R.A.S., Chancellor and Professor of Astronomy in the University of Western Pennsylvania and Honorary Fellow of the Society, delivered a lecture on "The making of a Great Telescope." From the standpoint of a practical optician, Dr. Brashear explained the various methods of "figuring" and mounting the modern telescope and the difficulties to be encountered and overcome in the work.

Professor DeLury, of Toronto University, under the auspices of the Society gave a series of popular lectures in the University buildings on "The Cosmos as understood by the Ancients," "The development of the Copernican theory," "The Newtonian advance to Physical Astronomy," "Special consideration of the Solar System," "La Place's Nebular Hypothesis and Stellar Evolution." These lectures were uniformly well attended by the public and evidently appreciated by all who heard them.

At the meeting of February the 25th Mr. J. E. Maybee presented sketches of regions of the moon's surface made by him at the telescope on February 19th, including Aristarchus, Herodotus and Schroeter's valley. Attention was called to the observations of Gruithensen and Dr. Kline, who both claim that the region surrounded by the valley or rill is strongly green in tint.

Rev. Robt. Atkinson contributed a paper on "the Planets," illustrating his remarks with lantern slides, and drawing attention to the features of particular interest from an observational standpoint.

March 25th, Mr. A. F. Miller contributed a paper on "The Spectroscope in Astronomical Research." A description of the various methods of reaserch in this line was given. The investigation of sun spots, facula, and the corona were touched upon, and the value of the spectroscope in determining stellar motion in the line of sight, and for detecting certain binary-stars, a class of bodies which, but for the spectroscope, would probably have never become known.

April the 8th, a communication from Prof. Campbell, director of the Lick Observatory, was received, relating to the method employed by Perrine to determine the non-polarity of light from condensations in nebula of Nova Persei, observed a few days before this date. It was explained that Perrine had interposed a double prism 3 inches in front of the photographic plate, and had rotated the prisms without getting polarization effects which should have shown if the light was reflected and not directly radiated.

The paper of the evening was by Prof. G. F. Hull, of Dartmouth College, on "The Pressure of Light in its application to Astronomical Problems." It was pointed out that Maxwell had shown that according to the electro-magnetic theory of light, light should exert a pressure on unit surface equal to the energy of one unit of volume, divided by the velocity of light. This magnitude, as calculated by him, was so small that little hope was held out of it ever being experimentally observed. Recent experiments by Dr. Hull and Professor Nichols had given decisive demonstration of the existence of this minute force, the actual force observed agreeing with the calculated result to within 5 per cent. A brief description of the apparatus was given. It was shown that on a body sufficiently small, the pressure due to the light of the sun would be greater than gravitative attraction, but there is a limit to this smallness. It was also remarked that velocity due to light pressure might be great, but it could not equal the velocity of light itself.

At the meeting of the 22nd April, Mr. Arthur Harvey made a few remarks regarding the value of the hand method of mapping the constellations. The President reported that the seismograph at the observatory had recorded a severe earthquake shock, accompanied by a sharp electrical disturbance on April 18th, at 4.38 p.m. The origin of the disturbance was afterwards found to be in Guatemala, the shock taking place there about eleven minutes before it was recorded in Toronto, and as the distance separating these two points is about 1,800 miles, 11 minutes would represent a velocity of $2\frac{2}{3}$ miles per second approximately. John A. Paterson, M.A., K.C., presented a paper dealing with "The Apex of the Sun's way." The different methods of determining the direction of the Sun's motion in space were commented upon and the most modern results presented, indicating apparently that the solar system is moving towards the vicinity of Vega, a bright star in the constellation Lyra, at the rate of about 10 miles per second.

May 6th, Mr. F. L. Blake, of the Observatory staff, described the transit instrument, also the chronograph and other instruments in use at the observatory for measuring and recording time. It was remarked that the mercurial pendulum is in use at the observatory in

Toronto. Mr. Arthur Harvey spoke of "Solar Radiation," and appears to have been the first to establish the fact that the auroræ synchronize at the north and south simultaneously.

May 21st, Mr. G. E. Lumsden read a paper on the subject of "Lunar Ring Plains." Attention was called to the fact, that on some portions of the moon, ring-plains occur with greater frequency than at others, and there appear to be vast differences in time as to the periods of their formation, some showing a perfect formation, whilst others are broken and worn away as if by the action of water or some other fluid at an earlier period of the moon's history.

June 3rd, W. B. Musson read an exhaustive and carefully prepared paper on "Variable Stars," in which he drew attention to the main points of difference between variables of short and long periods and also stars of the Algol class. While there was little doubt that the variability of the latter class is caused by the eclipse of one body by another, the fluctuations of long period variables is still much of a mystery. It was mentioned that Prof. Chandler had confirmed his theory advanced in 1888, that Algol and its companion moved in an orbit about a third body.

Mr. A. F. Miller spoke of his observations of the star (Y) Virginus which in 1837 was known as a double not very far apart. Mr. Miller's observations had shown the components to be considerably separated now and their angular positions also greatly shifted. The components are now equal in brightness and colour though they have been known to vary in both particulars.

September 9th, Mr. Andrew Elvins contributed a paper on "The cause of the 25-day period in the magnetic 'curve.'"

September 23rd, Mr. J. H. Wetherby contributed a paper entitled "Astronomical Work for the Autumn."

October 7th, Mr. Elvins and Mr. Miller reported observations of comet "Perrine." The latter had examined its spectrum and had found it to be that of a hydro-carbon incandescent gaseous body.

The paper for the evening was by J. R. Collins on "The Application of Kelvin's Theory of the Ether to the Stellar Universe." The necessity for supposing the ether to be rather of a continuous nature rather than consisting of discrete particles was pointed out and Kelvin's theory of vortices in this continuous substance was applied to a finite universe and some interesting deductions drawn from the results. The ether of a finite universe of this kind would be expected to have a definite surface and bundles of vortices which would be conceived as forming matter, rushing against its interior surface would be thrown backward with the velocity with which they came. It was said that

while any hypothesis dealing with the ultimate nature of ether and matter is put forth provisionally, Kelvin's concepts of it seem to have met with the most favour because of its simplicity and the facility it offers for explaining otherwise as yet unsolvable phenomena.

October 21st, G. E. Lumsden presented his views relative to "Ancient Lunar Coast Lines," illustrated by numerous lantern slides.

November 4th, W. F. King, C.E., chief astronomer, Ottawa, contributed a paper on "Astronomy in Canada," dealing with the outlook for the work here and having especial reference to the new Government Observatory at Ottawa.

November 18th, C. H. Chant, M.A., Ph.D., explained very fully the "New Developments in Wireless Telegraphy," with illustration of the different systems developed from their inception to the present time in connection with this interesting subject. Dr. Chant is somewhat of an expert, having been engaged in investigating the nature of phenomena presented from a physical standpoint and hopes shortly to be able to demonstrate with some approach to precision the precise nature of the etherial disturbance taking place when a wireless message is being transmitted.

December 2nd, Mr. Arthur Harvey under the heading of "Vagaries of the Mariners' Compass," presented curves which he had plotted from records obtained at the observatory, showing apparently that the motion of the North Magnetic Pole is irregular and not uniform as has generally been supposed.

December 12th, Mr. A. F. Miller read a paper on "Stellar Motions," the purport of which was to show in what way the various apparent motions might be so analyzed as to indicate the true movements of the stellar bodies in space.

December 30th, election of officers for 1903.

List of Officers.

Honorary President—The Hon. Richard Harcourt, M.A., LL.D., K.C., M.P.P., Minister of Education.

President—Mr. R. F. Stupart, F.R.S.C., Director of the Toronto Observatory and Superintendent of the Dominion Meteorological Service.

First Vice-President—Mr. C. A. Chant, M.A. (Tor.), Ph.D. (Har.), Lecturer in Physics, Toronto University.

Second Vice-President—Mr. W. Balfour Musson, 37 Yonge street, Toronto.

Treasurer—Mr. J. Edward Maybee, M.E., 103 Bay street, Toronto.

Secretary—Mr. J. R. Collins, 131 Bay street, Toronto.

Recorder—Mr. John E. Webber, 6 Sultan street, Toronto.

Librarian—Mr. Alfred McFarlane, M.A., Canadian Institute.

Curator—Mr. Robert Duncan, 516 Ontario street, Toronto.

Council—The above officers, with the following members, constitute the Council of the Society :—Mr. A. F. Miller; Professor A. T. DeLury, B.A., and Mr. George Ridout, elected by the Society, and the following past presidents: Mr. Andrew Elvins, Mr. Larratt W. Smith, K.C., D.C.L., Mr. J. A. Paterson, M.A. (Tor.); Mr. A. Harvey, F.R.S.C., Honorary President and Director of La Institutio Solar Internacional Monte Video, Uruguay; and Mr. G. E. Lumsden, F.R.A.S., and Membre de la Société Astronomique de France.

XV.—From the *Lundy's Lane Historical Society* through James Wilson.

I beg leave to report that in July, 1902, the Lundy's Lane Historical Society published the fifth volume of "The Documentary History of the Campaigns on the Niagara Frontier in 1812-14" (pp. 326), covering the period from January to June, 1813, collected and edited for the Society by Lieut.-Colonel E. Cruikshank. This volume contains nearly three hundred contemporary letters, documents and general orders transcribed from the original manuscripts preserved in the Archives of Canada, Great Britain and the United States, or in the possession of private individuals in these countries, who have generously permitted them to be copied for this purpose, and very few of which have appeared in print before. The sixth volume of the series, bringing the narrative down to 15th August, 1813, is now in the press and will be in readiness about July 1st, 1903.

The Society desires to express its hearty satisfaction at the transfer of that portion of the Ordnance Lands Reserve upon which the ruins of Fort Erie are situated (rendered memorable in the annals of Canada by the siege operations in August and September, 1814), by the Government of Canada to the commissioners of Queen Victoria Niagara Falls Park to be suitably maintained by them.

XVI.—From the *New Brunswick Historical Society,* through the Hon. J. V. Ellis.

As delegate of the New Brunswick Historical Society, I have the honour to present the following:

Papers read during the winter session :

1902.

Nov. 25.—Mr. Jonas Howe read a paper on the "Loss of the Birkenhead," and the brave death of Lieut. Hare, son of Capt.

Charles Hare, R.N., of this city, who was one of the officers of the ill-fated vessel.

Dec. 30.—Rev. Dr. Raymond read a paper on the "St. John River,"—the "Coming of the White Man."

1903.

Jan. 27.—S. D. Scott read a paper on "Cobbit's Life in New Brunswick," with many interesting particulars of his life while stationed with his regiment at Fort Howe, St. John, N.B.

Feb. 24.—Mr. Scott read the conclusion of his paper on "Cobbit's Life in New Brunswick."

Mar. 31.—Clarence Ward read a paper on the "First Common Council of St. John, N.B., with extracts from the account book of George Leonard, the first Chamberlain of the city.

For a considerable period the Rev. W. O. Raymond has been engaged on behalf of the Society in arranging and editing a large amount of correspondence of the Hon. Edward Winslow, who was Muster-Master-General of the Loyalist forces during the Revolutionary War. These letters commencing in 1776 in New York and terminating in New Brunswick in 1820, contain an immense amount of valuable and interesting information, concerning the emigration and settlement of the great number of Loyalists who came to New Brunswick and Nova Scotia on the termination of the war.

The industry, learning and research given to the work by Mr. Raymond is beyond all praise.

The whole correspondence has now been published by the Society in a volume of 800 pages, and is a most valuable contribution to the history of the time.

The Society was aided in the publication of these letters by a grant from the Legislature of New Brunswick, and a contribution from the Winslow family.

XVII.—From the *Ontario Historical Society,* through David Boyle.

The last annual meeting of the Ontario Historical Society was held in the towns of Peterboro and Lindsay on the 4th and 5th of June, 1902, and was well attended by representatives from various parts of the Province and from Manitoba. Valuable papers were read during the sessions by Mrs. Fessenden "On the Monument that Failed" (Montgomery Monument at Quebec), by Judge Dean of Lindsay on "Local Scenery and Historical Associations," by Miss Farmer on the "Fall of Acadia," by Mrs. Holden on the subject entitled "In the Heart of the Battle," by Mr. Hampden Burnham on "The Feud of

the Huron-Iroquois, and by Mr. Yeigh on "Historic Land Marks in Ontario." Mr. James H. Coyne, who had been President since the foundation of the Society, retired, much to the regret of all the members, and was succeeded by Mr. C. C. James, Deputy Minister of Agriculture for Ontario. Members were conveyed by steamer from Lakefield, near Peterboro, to Lindsay, through the beautiful waters known as the Kawatha Lakes. In both times the inhabitants manifested considerable interest in the Society's work, and several new members were added to the roll.

At the Easter meeting of the Ontario Educational Association the Society held a highly successful joint meeting with the Historical section of that Association. During the year the Society has seen the completion of the first volume of the Galinee Journal, translated and edited by James H. Coyne. Copies of these have been sent to all the members of the Society, and the outside demand has been lively. The Society has also to congratulate itself on the completion of the Simcoe statue, a work which had been hanging fire for several years until the Society undertook to see it completed. This statue will be unveiled in the presence of the Governor-General, Lieutenant-Governor, the Premier of Ontario, and other distinguished gentlemen on the 27th of this month. The membership of the Society numbers two hundred and eighty, including six honorary members, six corresponding members, and sixteen ex-officio members. This membership extends from Halifax to Dawson, and is represented in all the territories as well as in all the provinces of the Dominion.

XVIII.—From the *Women's Canadian Historical Society of Toronto*, through Mrs. Ahearn.

During the past year, the Society has held its regular monthly meetings, at which the following papers have been read:

"Indian Summer in Prose and Poetry," Miss Sara Mickle.

"The Fall of Acadia," Miss E. Yates Farmer.

"The Coronation Scenes in England," Miss M. A. Fitz-Gibbon.

"Laying the Foundations of Ontario," Mr. C. C. James.

"Lachine," Miss Blanche Macdonell (of Montreal).

"The Visit of the Canadian Teachers to Winchester," Mrs. S. G. Wood.

The Victoria Memorial Hall Fund has reached the sum of $2,676, and it is earnestly desired by all the members that steps should be taken towards securing a permanent place of meeting, where suitable tablets and records might be placed. It is confidently expected that next year will see some satisfactory advance in this movement.

Acting in concert with nearly all the historical and kindred societies throughout Canada, the Women's Canadian Historical Society joined in protesting against the erection of a monument to General Montgomery, in the city of Quebec. Petitions were prepared by a committee appointed for that purpose and forwarded to His Majesty, to His Excellency the Governor-General, and to the Mayor of Quebec.

The Society has to deplore the loss by death of two of the most influential and important of its honorary members—Sir John G. Bourinot, K.C.M.G., F.R.S.C., and Dr. Douglas Brymner, to both of whom we have been indebted at various times for invaluable help and suggestions freely given.

In the death of Miss Seymour, late of Ottawa, the Society has lost one whose interest in historical work was great. She was, we believe, the only one left who remembered the taking of York by the American forces in the war of 1812. At the time our first Transaction was published, she was the only survivor of those who had worked the historic banner which it described.

During the year fifteen new members have been added to our list.

While something of real historic work has been accomplished by our Society in the past, we are hoping for more thorough and wider effort in the future. Especially do we hope for the establishment of a vigorous and enthusiastic national historical association.

The following are the officers of the Society:

Hon. President—Miss Mowat.

President—Mrs. Forsyth Grant, 30 Nanton Crescent.

1st Vice-President—Mrs. John A. Paterson.

2nd Vice-President—Mrs. Willoughby Cummings.

Treasurer—Mrs. C. D. Cory, 21 Prince Arthur Ave.

Cor. Secretary—Miss Jean Graham, 22 St. Mary Street.

XIX.—From the *Niagara Historical Society,* through Miss J. Carnochan.

In presenting the report of the Niagara Historical Society we have to record a year of progress, steady if not rapid. Each year seems to be marked by some special feature of growth. While our last report chronicled the placing of seven markers for historic spots, this year's record shows that a greater number of papers have been read at our meetings and that we have published two historical pamphlets instead of one as usual. No. 9 and 10 have been issued since our last report and when it is remembered that we are only in the eighth year of our existence, this may be taken as no mean record.

Seven meetings were held from October to May, and the following original papers read:

"A Wife's Devotion," a Niagara heroine of 1837, by the President.
"Value of an Historical Room," by Rev. J. C. Garrett.
"Two days in Quebec in 1838 and a day at the Falls in 1860 on the occasion of the King's visit," by W. Kirby, F.R.S.C.
"The Vicissitudes of the Niagara Library for Fifty Years," by the President.

The number of members has slightly increased, numbering over fifty, more than half non-resident. We have published during the year No. 9 Diary of W. H. Merritt, Journal of Col. Claus and letters of Chief Norton, by Col. E. Cruikshank, and No. 10, Inscriptions and graves in the Niagara Peninsula by the President.

During the year a visit was paid to our Historical Room by permission of the Minister of Education by Mr. David Boyle, Superintendent of Educational Museum, who gave many valuable hints and much help in classification. His report speaks of the great value of our collection and the impossibility were it destroyed of duplicating the articles, emphasizing strongly the necessity of a good building, fire-proof, and easily accessible for a collection which is now of provincial value. On the 17th September, we paid our usual visit to the grave yards of the town as well as Butler's to decorate the graves. Our collection is increasing, the room is open weekly and during the summer months, sometimes daily. Several interesting photographs of groups of articles were taken by Mr. Walker and Mr. Sherk, of Toronto. Many letters have been received asking information which we have frequently been able to give from our papers, documents, etc.

A tablet was placed on the Court House showing that it was built in 1847 for the United Counties of Lincoln, Welland and Haldimand.

We exchange with twenty societies and have distributed six hundred of our publications during the year. In closing we would refer to the condition of the Military Reserves in Niagara. While Queenston Heights and Fort Erie have been placed in the hands of the Niagara Falls Park Commissioners for beautifying and preservation, we feel that the same is necessary with regard to Fort George, Navy Hall and Fort Mississagua, where soldiers of the King lie buried, where the first Parliament was held and the slave made free; all lie neglected and falling to decay, other buildings have been burned, notably the Military Hospital and Commandant's House. Navy Hall Inn destroyed, Powder Magazine in ruins, log buildings of Fort Mississagua removed, Navy Hall falling to pieces. It is earnestly hoped that all will unite to preserve what we have

left of historic interest, in ground drenched with the blood of the heroes of the past, who so nobly stood for King and country.

The following are the officers for the ensuing year:—

Patron—W. Kirby, F.R.S.C.

President—Mrs. Carnochan.

Vice-President—H. Pafford.

Secretary—A. Ball.

Treasurer—Mrs. Manning.

Editor and Curator—Miss Carnochan.

Committee—Rev. J. C. Garrett, R. L. Barron, B.A., Rev. N. Smith, Mrs. T. F. Best, W. J. McClelland.

Hon. Vice-Presidents—Mrs. Roe, Mrs. Clement, C. F. Ball.

XX.—From the *Miramichi Natural Historical Association*, through G. B. Fraser.

Another year of sustained interest and satisfactory progress has been added to the life of this young society. Though the list of members was somewhat reduced by removals, some new ones were added, so that the total membership remains about the same as it was last year, namely eighty-four.

During the nine months comprising the Association's year, regular monthly meetings, and ten additional ones in the lecture season, were held, all of which were well attended.

The growth of the museum has kept pace with the general progress of the Society. Among the more prominent additions to the Department of Zoology, were mounted specimens of the cow moose, *A. americanus;* Seal, *P. vitulina*; and Black Porpoise, *P. communis.*

The list of mounted birds was enlarged, and several mounted fishes and a number of alcoholic specimens of reptiles, fishes, and various invertebrates were added.

A large collection of plants was made during the year, to be mounted when opportunity offers from time to time, and placed in the herbarium cabinet.

Some interesting objects in archæology were secured, and others donated, especially aboriginal stone implements of which the collection is quite extensive. A reference to the list of donations in Bull. No. III., published this year and a copy of which accompanies this report, will show the interest being taken in the work of the Association, by the public in general. Some of the articles in the Bulletin bear evidence of the original work being done by members of the Association in the study of algæ, protozoa, and comparative zoology. Indeed the Asso-

ciation has every reason to feel encouraged by the energy and earnestness its members are showing.

It is fitting that reference be again made to the death of the late patron of the Association, and perhaps the very words of the Council's report in Bull. No. III., best express the feelings of this Society. To quote :—" In presenting its third biennial report of the proceedings and condition of the Association, the Council would refer to the irreparable loss that, in common with other scientific institutions in Canada and elsewhere, it sustained in the early and lamented death of its distinguished patron, Dr. G. M. Dawson, late director of the Geological Survey of Canada. The honour he conferred on the Association by accepting the position was even exceeded by the warm helpful interest he took in its welfare and progress; and hence its loss is more direct and personal than that of many institutions. He was one of Canada's most distinguished sons, into the short span of whose life was crowded a wealth of scientific research and labour, a harvest of patient investigation and discovery which would have done honour to the longest life. While the Association then mourns the death of its patron and will miss his guiding, inspiring, and generous spirit, it finds some consolation and no little pride in enrolling among its early friends and supporters, one whose memory will be ever dear to the scientific heart of Canada."

The following are the officers for 1903 :—

Patron—His Honour Lieutenant Governor Snowball.

President—Philip Cox, Ph.D.

Vice-Presidents—D. Ferguson, J. D. B. F. MacKenzie.

Secretary—G. B. Fraser.

Corresponding Secretary—Dr. J. McG. Baxter.

Treasurer—George Stothart.

Librarian—Miss Bessie M. Creighton.

Curators—Geoffry Stead, James McIntosh, Mrs. R. Flanagan, Miss Sutherland, Miss M. Flood.

Additional members of the Council—J. L. Stewart, Miss Ida Haviland, Miss K. J. B. McLean.

XXI.—From the *Canadian Forestry Association,* through E. Stewart.

I have the honour in behalf of the Canadian Forestry Association to present the following report of the Association for the past year :

This Association, which was organized in March, 1900, has now a membership of 450, of whom 17 are life members.

The work of the Association is apparent in the increased interest shown not only by the public, as evidenced by the attention given to forestry by the press of the country but by direct legislation for the better preservation of our natural forests. The directors recognize that they are dealing with a subject of vast importance to Canada and they look with confidence to the future for greater attention and assistance on the part of the people in their work.

In the last report reference is made to the setting aside of certain areas as timber reserves in the Railway Belt in British Columbia. These consist of the Long Lake Reserve southwest of Kamloops, and the Yoho Park in the Rocky Mountains. The Rocky Mountains Park has also been greatly enlarged and now embraces an area of about 2,880,000 acres and includes the whole of the upper valley of the Bow River. Reference is made to the good work resulting from the employment of forest fire guardians as shown by the comparatively small loss of timber from fire where the system is in operation as compared with the destruction from this cause where such means are not adopted.

The report refers to the work of co-operation with the farmers in forest tree culture on the treeless prairies of Manitoba and the North-West Territories which was started a couple of years ago by the Forestry Branch of the Department of the Interior. This work is assuming large proportions. Within the past two months over 900,000 trees and about 700 pounds of tree seed have been distributed to farmers in all parts of the country who had prepared their land to the satisfaction of inspectors employed by the department who had examined it.

Mention is made of the growing interest in forestry, as evidenced by the recent action of the University of Toronto and of Queen's University at Kingston, looking towards the establishment of chairs of forestry in those institutions.

The last annual meeting of the Association was held at Ottawa on the 5th and 6th of March last, at which papers on the following subjects were read:

"The Forests of New Brunswick," by His Honour the Lieutenant-Governor of New Brunswick.

"A Report on the Conditions of Lumbering and Forestry in Western Nova Scotia," by F. C. Whitman, Annapolis Royal, N.S.

"Forest Fires," by W. A. Hendry, formerly Deputy-Commissioner of Crown Lands, Halifax, N.S.

"History and Results of the Fire Ranging System in Ontario," by Aubrey White, Deputy Commissioner of Crown Lands, Toronto, Ont.

"Forest Protection in the Railway Belt, British Columbia," by James Leamy, Dominion Crown Timber Agent, New Westminster, B.C.

"The Forest Fires of 1902," prepared by instruction of the Association.

"Tree Planting in Manitoba," by A. P. Stevenson, Nelson, Manitoba.

"The Growth of Forest Trees in the Forest Belts and Arboretum of the Experimental Farm," by W. T. Macoun, Horticulturist at the Experimental Farm, Ottawa.

"Forestry Education," by Professor W. L. Goodwin, School of Mining, Queen's University, Kingston, Ont.

"The Effect on Fish Life of Sawdust in Rivers," by A. P. Knight, Queen's University, Kingston, Ont.

On the evening of the 5th, an illustrated lecture on "Forest Trees and Their Uses" was given by Professor E. C. Jeffrey, of Harvard University, Cambridge, Mass., in the Assembly Hall of the Normal School.

The officers for the ensuing year are:

Patron—His Excellency the Earl of Minto, Governor-General.

Honorary President—William Little, Westmount, P.Q.

President—Hiram Robinson, Ottawa.

Vice-President—Aubrey White, Deputy Commissioner of Crown Lands, Toronto, Ont.

Vice-Presidents for the Provinces and Districts—Ontario, J. B. McWilliams, Peterborough, Ont.; Quebec, Hon. S. N. Parent, Premier of Quebec, Que.; New Brunswick, His Honour J. B. Snowball, Lieutenant-Governor of New Brunswick, Fredericton, N.B.; Nova Scotia, A. H. MacKay, LL.D., Superintendent of Education, Halifax, N.S.; Prince Edward Island, Rev. A. E. Burke, Alberton, P.E.I.; Manitoba, Major Stewart Mulvey, Winnipeg, Man.; Assiniboia, J. S. Dennis, Commissioner of Irrigation for the Canadian Pacific Railway Company, Calgary, Alta.; Saskatchewan, P. G. Laurie, Battleford, Sask.; Alberta, William Pearce, Calgary, Alta.; Athabasca, F. D. Wilson, Fort Vermilion, Atha.; British Columbia, Hewitt Bostock, Ducks, B.C.; Yukon, The Commissioner, Dawson, Yukon; Keewatin, the Lieutenant-Governor of Manitoba, Winnipeg, Man.

Secretary, E. Stewart, Dominion Superintendent of Forestry, Department of the Interior, Ottawa.

Assistant Secretary and Treasurer—R. H. Campbell, Department of the Interior, Ottawa.

Directors—Wm. Saunders, LL.D., F.R.S.C., Director of Experimental Farms, Ottawa; Prof. John Macoun, F.L.S., F.R.S.C., Assistant Director of the Geological Survey, Ottawa; Thos. Southworth, Director of Forestry, Toronto, Ont.; C. Jackson Booth, Ottawa; J. R. Booth,

Ottawa; E. G. Joly de Lotbinière, Quebec, Que.; John Bertram, Toronto, Ont.

XXII.—From the *Women's Canadian Historical Society of Ottawa*, through Mrs. S. E. Dawson.

The following is a report of the work of the Women's Canadian Historical Society of Ottawa for the year 1902-1903.

During the past year there have been eight executive and six general meetings.

At the opening meeting in October last in place of the historical paper for that month Mrs. Ahearn, the treasurer, consented to give the Society her impressions of Egypt gathered during a recent visit to that land.

In November while the memories of the Coronation were still fresh in our minds the Society wished to have the pleasure of hearing an account of it from one who had actually witnessed the great procession to Westminster Abbey and Mrs. J. Lyons Biggar gave a bright and graceful account of what she had seen, touching on many most interesting incidents the result of her own personal observation.

The subject for December last was "Aylmer," a paper read by Miss Read, showing much careful preparation and full of historical interest.

At the January meeting a very clever and scholarly paper was read by Miss Whiteaves on "The Women Workers of Ottawa," acquainting us with many interesting facts.

It was with intense interest that we listened in February last to Madame Pigeon's paper on the "Indians of the Ottawa Valley," full of poetic description of the Ottawa River scenery, aboriginal Indian customs, characteristic legends, and history, the fruit of many months of careful study and preparation.

In March Mrs. D. H. McLean prepared and read the first of a series of articles on Canadian men of note. The subject of her sketch was the life of Sir James Macpherson LeMoine, D.C.L., a paper which gave us a very clear insight into the life, character and work of one of the most prolific writers on Canadian life and history.

The Society intends to have these papers printed in the next volume of its Transactions so that the members as well as those interested in the Society and its aims may have the pleasure of reading them.

A most enjoyable drawing room meeting was held in January last at the residence of Mrs. Ahearn, at which Dr. Drummond read a num-

ber of selections from his book of poems "The Habitant," affording great pleasure to all who had the good fortune to be present.

The Scrap Book Committee carries on a record of current history which in future years will be of much interest.

The work has been progressing slowly during the year. The three books of the committee are the "Local Events" in Miss Masson's charge; "The Canadian Events," in Miss Eva Read's care and the one devoted to "Ottawa," that is the growth and improvement of the city itself, is kept by Miss Horsey.

Clippings are all dated, the name of the paper from which they are taken inserted, and they are kept safely in large envelopes until pasted in the books.

Our President has during the past year kept the diary of "Current Events" which will be a record of the greatest interest a few years hence. In January last, Mrs. Kirwan undertook this work for the present year.

Among the Society's treasures are the originals of the South African letters of Mr. Edward Holland, V.C., which he kindly presented to the library of the Historical Society.

XXIII.—From *The United Empire Loyalists' Association of Ontario,* Head of the Lake Branch, through H. H. Robertson.

Your committee report that the progress of this branch of the U. E. L. A. of Ontario has been gratifying, the total membership of the branch including families now being fifty-nine, exclusive of associate members. Changes have been made in the constitution of the general association in the past year as follows:—Amendment to article II, to add after the word "Members," "Provided that branches may also choose an honorary president, second vice-presidents, a secretary and an assistant secretary, an executive committee of not more than six members, and a ladies' committee of not more than twelve. The presiding officer of the ladies' committee may also be a member of the executive committee." "Also that no person coming to Canada from the United States after the year 1796 shall be considered as a U. E. Loyalist ancestor unless it can be clearly demonstrated that he or she was entitled to be so considered."

A form of opening and closing meetings, and reception of members has also been adopted by the association all of which will be set forth in the forthcoming number of the Transactions now in the press.

The officers elected at the first meeting have remained for the year.

During the year addresses have been delivered as follows:—

On March 11th, by the President, "Reminiscences of the War of 1812."

On April 8th, by the Secretary, "The Narrative of John Peters."

On May 13th, by Mrs. Powell, "A diary, descriptive of a canoe trip from Montreal to Detroit in 1783."

On June 13th, by H. H. Robertson, "Burgoyne's Campaign and Loyal Americans." (Illustrated by lime light views.)

On December 9th, Miss N. M. Clarkson, Honorary Secretary, read a paper by T. S. Arnold, entitled, "The Battle of the Thames and the Death of Tecumseh."

On January 14th, 1903, by J. H. Smith, "History of Hamilton."

It is the desire of your committee that every member of the association should furnish a paper in furtherance of its objects, "to preserve the history and traditions of the Loyalist families before it is too late." This can be done by every member contributing the narrative of his or her U. E. Loyalist ancestor, and it is to be hoped that the ensuing year will see additional contributions in this direction.

Early in the year a complete set of the Transactions of the Association was donated to the Hamilton Public Library, and through the instrumentality of the Association, copies of "The Settlement of Upper Canada," by Dr. Canniff; "The History of the County of Dundas," by Croil, and of "Lunenburgh," or "The Eastern District," by the late Judge Pringle, of Cornwall, dedicated to the descendants of the U. E. Loyalists, were obtained and placed in the Hamilton Public Library.

The importance of maintaining the historical branch of the Museum begun at Dundurn is impressed upon the members of the Association, and if an amalgamation of the various small collections could be made at this central point, a really good museum would result. Steps should be taken to bring this about, and the good will of the Parks Committee of the city obtained to that end.

Officers for 1903:—

Honorary President—J. E. O'Rielly.

President—His Honour, Judge Snider.

Vice-President—S. F. Lazier, K.C.

Vice-President—W. A. H. Duff.

Honorary Secretary-Treasurer—H. H. Robertson.

Committee—A. C. Beasley, J. H. Smith, J. M. Dingwall, Edwin Mills, Justus Griffin, W. G. Moore.

XXIV.—From the *Report of the Botanical Club of Canada for the Year 1902-3.*

By the General Secretary, A. H. MacKay, LL.D.

The phenological tables compiled from the numerous reports of observers are this year more extensive than usual. Those who want fuller information, therefore, on such subjects as the officers, objects and constitution of the Club, the schedules of objects for observation and the directions for observation and compilation, are referred to the report of last year, and of previous years.

The first table contains the observations of the following members of the Club on the dates of the first appearances of the phenomena briefly indicated only in the table, although precisely specified in the schedules for recording them. Their addresses and stations are as follows, in the order of the table:

T. A. Good, Woodstock, New Brunswick; J. M. Duncan, Charlottetown, Prince Edward Island; John MacSwain, Charlottetown, Prince Edward Island; Dr. Cephas Guillet, Ottawa, Ontario; Mrs. Frank E Webster, Beatrice, Muskoka, Ontario; Dr. J. H. Elliott, Gravenhurst, Muskoka, Ontario; T. R. Donnelly, Pheasant Forks, Assiniboia; Percy B. Gregson, Blackfalds, Alberta; J. K. Henry, B.A., Vancouver, British Columbia.

The first column is the average of about 350 schedules of observations made by as many of the public schools of the Province of Nova Scotia, and other active members of the club among whom the following have been sending in reports: Rev. James Rosborough, Musquodoboit Harbor, Halifax Co.; Miss Louise MacMillan, Sydney Mines, Cape Breton; Mrs. G. Ormond Forsyth, Port Hawkesbury, Inverness Co.; and Miss Janet Keith Bruce Kelley, Yarmouth.

The last column is the average of scattered observations from about ten observers in different parts of the south of British Columbia, five being from Vancouver Island or the coast, two from the dry belt, and three from the mountain belt. These observations were made on the schedule prepared and published by the Natural History Society of the Province, and were communicated to me by A. J. Pineo, Esq., B.A., of Victoria.

A more detailed summary of the observations in Nova Scotia and British Columbia are given in the two succeeding tables. As the Nova Scotian phenochrons are based on about 350 schedules, it will be observed that, as a rule, a good many schedules are averaged for each of the ten meteorological or biological regions of the Province. The individual schedules are annually bound up into a volume which can

be utilized by weather students in the future with every facility. There are already a number of such volumes in existence. And those of the last years have, to a considerable extent, been analyzed and compiled by a staff of specialists so as to give the phenochrons of the coast, lowland and highland belts of each county. These sheets are likewise being bound up in annual volumes. The Nova Scotian table published here is merely the most generalized average of averages.

A close study of the tables showing individual observations, will create the impression that observers are not always in a position to note the phenomena of the seasons when they first appear. In this respect the observations conducted by the public schools are more accurate. For they are made by a large number of individuals travelling nearly every day to school and radiating from this central point of the community for a distance generally of about two miles. As the teachers stimulate "observing" by noting the first one who brings evidence of the first appearance of a flower, etc., there is a great deal of competitive observation on the part of the young people. This not only makes the travelling to and from school more interesting; but is found to be a great aid to general "nature study." Accuracy is assured by the bringing of the specimen to the school room when practicable.

But even in schools mistakes may occur through accident in recording, and sometimes from lack of sufficient knowledge of the natural history of the locality. In order to discover such mistakes, and to enable directions to be framed in order to minimize them, as well as for the purpose of studying and compiling regional phenochrons, the observation schedules filled in by the teacher of each school is sent to one of a staff of specialists. Their criticisms are annually published in the *Journal of Education of Nova Scotia*, which also contains the names of observers and number of observations made in each of the schools reporting. Under the advice of the staff several changes were made in the schedules issued after 1902. Next year this schedule may be given in full in my report, the observations contained in it being based on the same list.

The names and addresses of the Nova Scotian Phenological staff at present are as follows:

C. B. Robinson, B.A., Science Master, Pictou Academy.
E. J. Lay, Principal, Amherst Academy.
J. E. Barteaux, Science Master, Truro Academy.
Antoinette Forbes, B.A., Windsor Academy.
Burgess McKittrick, B.A., Principal, Lunenburg Academy.
Minnie C. Hewitt, Lunenburg Academy.
G. R. Marshall, Principal, Richmond School, Halifax.

Stanley C. Bruce, Principal, Shelburne Academy.

A. W. Horner, Principal, Public School, Yarmouth.

In the western province western species or varieties have sometimes been observed instead of those of the schedule which is eastern in its complexion. In the most of these cases the western species is indicated by an index letter referring to a footnote under the tables.

The officers of the Club are the same as last year. The exchange and determination of species can be most effectively made for members of the Club by James A. Macoun, M.A., Curator of the Herbarium, Geological Survey of Canada, Ottawa, to whom parcels of plants go free of postage.

The address of the General Secretary of the Club is : A. H. MacKay, LL.D., Halifax, Nova Scotia.

Blank schedules for the recording and reporting of phenological observations will be sent free to anyone making application. It is recommended that the observer keep the original schedule, sending the Secretary a true copy of it—at the latest by the end of the year.

PHENOLOGICAL OBSERVATIONS, CANADA, 1902.

Observation Stations—When First Seen.

Number	Day of the year 1902 corresponding to the last day of each month. Jan. 31, Feb. 59, March 90, April 120, May 151, June 181, July 212, Aug. 243, Sept. 273, Oct. 304, Nov. 334, Dec. 365	Average dates for Nova Scotia	Woodstock, N.B.	Charlottetown, P.E.I. (1)	Charlottetown, P.E.I. (2)	Ottawa, Ont.	Beatrice, Muskoka, Ont.	Muskoka, Ont.	Pheasant Forks, Assa.	Blackfalds, Alberta.	Vancouver, B.C.	Average dates for British Columbia.
1	Alnus incana, Willd.	93.5	*95	116	123	97	87	.....	....	.....	*d*59	*d*108.7
2	Populus tremuloides, Mx.	103.5	*102	.....	127	96	*99	.....	137	135	.....	.....
3	Epigæa repens, L.	94.9	.....	76	107	*106	.....	99	.....	.....	.....	.....
4	Viola cucullata, Gray	119.1	*102	117	.....	132	*110	114	137	123	*e*97	.....
5	V. blanda, Willd.	116.9	*102	117	.....	120	*112	103	140	.....	100	.....
6	Acer rubrum, L.	117.1	*115	121	123	96	*110	107	.....	.....	*f*92	.....
7	Houstonia cærulea, L.	131.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
8	Equisetum arvense, L.	122.4	.....	.....	.....	104	*142	.....	.....	.....	80	.....
9	Taraxacum officinale, Web.	119.8	122	120	130	109	*126	112	138	195	.....	.....
10	Erythronium Amer., Key.	130.8	*122	.....	.....	108	*142	112	.....	.....	.....	.....
11	Hepatica triloba, Chaix.	117.4	.....	.....	.....	86	.....	87	.....	.....	.....	.....
12	Coptis trifolia, Salisb.	128.3	*143	.....	.....	120	*142	123	.....	.....	.....	.....
13	Fragaria Virginiana, Mill	117.6	125	147	138	111	*161	120	127	156	.....	102 8
14	" (fruit ripe)	166.6	...	.....	.....	161	.....	.....	183	200	... ..	153.
15	Prunus Pennsyl., L.	141.2	143	.....	.....	127	*138	133	147	143	*g*116	.....
16	" (fruit ripe)	223.1	.....	232	.....	.....	.....	.....	.....	223	.....	.....
17	Vaccinium Penn., Lam.	141.0	145	.....	.....	119	.....	123	.....	.....	.....	128
18	" (fruit ripe)	207 1	.....	.....	.....	.....	*216	.....	.....	219	.....	185.1
19	Ranunculus acris, L	147.2	149	166	.....	140	*156	153	120	170	*130	119.6
20	R. repens, L.	155.3	151	127	.....	154	.....	.....	.....	.....	125	.....
21	Clintonia borealis, Raf.	155.2	....	.....	.....	.....	.....	145	.....	.....	...	.....
22	Trillium erythrocarpum	148.0	*143	.....	.....	125	*130	138	.....	.....	.....	.....
23	Trientalis Ameri., Pursh	147.4	.....	145	.....	137	.....	141	.....	.....	*h*124	.....
24	Cypripedium acaule, Ait.	158.4	.....	.....	.....	137	*163	142	.....	*b*170	.....	*k*121.8
5	Calla palustris, L.	160.6	.....	.....	.....	164	*156	.....	.....	.....	.....	.....
26	Amelanchier Canadensis	138.8	.....	147	...	120	*126	124	144	*c*143	.....	*c*123.5
27	" (fruit ripe)	194.0	.....	.....	.....	.....	.....	.....	.....	205	.....	.....
28	Rubus strigosus, Michx.	158.6	.....	.....	.....	151	*166	151	170	180	*i*69	*i*141.6
29	" (fruit ripe)	203.8	.....	.....	....	.....	*211	.....	.....	210	149	196.
30	Rubus villosus, Ait.	166.1	.....	.....	.....	153	*166	155	.....	....	.....	.....
31	" (fruit ripe)	232.7	.....	.....	.....	.....	*222	.....	.....	.....	.....	.....

* When becoming common. *a* Rosa blanda. *b* Cypripedium hirsutum.
c a. alnifolii. *d* Alnus rubra. *e* Viola palustris. *f* a. macrophyllum.
g Prunus emarginata. *h* Trientalis Europæa. *i* Rubus spectabilis. *j* Rosa. *k* Calypso.

PHENOLOGICAL OBSERVATIONS, CANADA, 1902.

Observation Stations—When First Seen.

Number	Day of the year 1902 corresponding to the last day of each month. Jan..... 31 July.....212 Feb ..... 59 Aug... 243 March.... 90 Sept.....273 April.....120 Oct ..... 304 May.....151 Nov .... 334 June .... 181 Dec 365	Average dates for Nova Scotia.	Woodstock, N.B.	Charlottetown, P.E.I. (1)	Charlottetown, P.E.I. (2)	Ottawa, Ont.	Beatrice, Muskoka, Ont.	Muskoka, Ont.	Pheasant Forks, Assa.	Blackfalds, Alberta.	Vancouver, B.C.	Average dates for British Columbia.
32	Kalmia glauca, Ait	151.4	.....	....	.....	171	.....	142	.....	.....	*122	.....
33	K. angustifolia, L.....	163.7	.....	....	.....	171	...	....	..	....	.....	.....
34	Cornus Canadensis, L.....	152.4	.....	147	.....	142	*166	142	.....		127	l133.2
35	" (fruit ripe)....	216.1	.....	...	.....	.....	.....	.....	.....	.....	.....	.....
36	Sisyrinchium angustifol	158.5	.....	....	.....	148	.....	181	173	160	.....	.....
37	Linnæa borealis, L.	168.6	....	....	....	160	*193	.....	.....	.....	.....	137.3
38	Linaria Canaden., Dum..	171.5	.....	.....	.....	176	.....	196	.....	.....	....	.....
39	Rhinanthus Crista-galli, L	170.5	.....	.....	....	.....	.....	.....	.....	....	.....	.....
40	Sarracenia purpurea, L....	165.2	....	.....	.....	171	*163	176	.....	.....	.....	.....
41	Brunella vulgaris, L	171.5	.....	.....	.....	160	*176	166	....	.....	.	179.7
42	Epilobium augustifolium,	186.9	.....	.....	.....		*192	181	....	200	*171	177.
43	Rosa lucida, Ehrh.....	181 5	.....	.....	.....	.....	..	a166	168	173	j141	j142.6
44	Hypericum perforatum, L.	170.0	.....	....	.....	.....	*193	186	.....	200	.....	
45	Leontodon autumnale, L..	169.6	.....	168	.....	.....	*310	.....	.....	206	.....	.....
46	Prunus Cerasus (cultiv.)	143.3	.....	147	145	....	....	....	....	.....	103	.....
47	" (fruit ripe)....	197.2	.....	.....	.....	.....	....	.....	....	.....	159	.....
48	Cratægus Oxyacantha, L..	158.5	....	167	.....	.....	.....	.....	.....	.....	.....	151
49	C. coccinea, L.....	155.2	.....	158	163	140	*133	.....	151	.....	....	.....
50	Prunus domestica (cult'd.)	145.4	.....	147	.....	125	.....	.....	158	.....	97	.....
51	Pyrus malus (cult'd) early	147 6	.....	150	154	132	*144	.....	.....	.....	114	128.6
52	" " late..	155.8	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
53	Ribes rubrum (cultivated)	141.9	.....	.. . .	.....	.....	*131	....	144	.....	91	113.9
54	" (fruit ripe) ..	193.7	.....	.....	.....	193	.....	.....	.....	....	.....	.....
55	R. nigrum (cultivated)....	142.9	.....	.....	.....	....	*134	.....	149	.....	.....	.....
56	" (fruit ripe)....	207.1	.....	.....	....	193	.....	.....	.....	....	.....	132.6
57	Syringa vulgaris, L. (cult.)	160.8	.....	161	163	145	146	.....	163	.....	123	165.6
58	Solanum tuberosum, L....	185.9	.....	.....	.....	...	.....	.....	.....	200	....	178.4
59	Phleum pratense, L.....	177.9	.....	.....	.....	.....	.....	.....	.....	180	.....	137.5
60	Trifolium repens, L.....	162.6	.....	.....	.....	143	.....	144	.....	170	125	144.8
61	T. pratense, L.....	159.5	.....	180	.....	151	.....	152	.....	.....	133	180.

* When becoming common.
j Rosa.
a Rosa blanda.
l c. nuttallii.

PHENOLOGICAL OBSERVATIONS, CANADA, 1902.

Observation Stations—When First Seen.

Number	Day of the year 1902 corresponding to the last day of each month. Jan .... 31 July.....212 Feb..... 59 Aug.....243 March ... 90 Sept .....273 April ....120 Oct.....304 May.....151 Nov.....334 June.....181 Dec..... 365	Average dates for Nova Scotia.	Woodstock, N.B.	Charlottetown, P.E.I. (1)	Charlottetown, P.E.I. (2)	Ottawa, Ont.	Beatrice, Muskoka, Ont.	Muskoka, Ont.	Pheasant Forks, Assa.	Blackfalds, Alberta.	Vancouver, B.C.	Average dates for British Columbia.
62	Triticum vulgare, L.....	205.0	.....	.....	.....	.....	...	.....	.....	205	.....	.....
63	Avena sativa, L.....	201.7	.....	.....	.....	.....	.....	.....	.....	205	.....	.....
64	Fagopyrum esculentum, L	194.9	.....	....	....	177	.....	192	.....	....	....	.....
65a	Earliest full leafing of tree	137.5	.....	.....	.....	....	140	.....	....	.....	....	.....
65b	Latest " "	165.2	.....	.....	.....	.....	.....	.....	.....		.....	.....
66	Ploughing (first of season)	104.6	.....	.....	.....	90	*121	.....	113	97	.....	.....
67	Sowing " "	117.2	.....	106	113	.....	.....	.....	121	97	.....	.....
68	Potato-planting "	115 1	.....	113	.....	....	*136	....	147	123	.. .	.....
69	Sheep-shearing "	125.5	100	.....	.....	.....	*132	.....	153	175	...	.....
70	Hay-cutting "	192.9	....	.....	.....	.....	205	.....	.....	200	....	.....
71	Grain-cutting "	231.0	...	231	232	.....	234	....	240	.....	.....	.....
72	Potato-digging "	258.3	.....	.....	.....	.....	262	.....	.....	2?5	....	.....
73a	Opening of rivers "	72 7	.....	5	67	95	.....	....	83	101	....	.....
73b	Opening of lakes "	78.9	.....	.....	....	....	.....	.....	....	120	.....	.....
74a	Last snow to whiten gr'nd	103 0	.....	133	.....	.....	148	.....	....	153	.....	98.2
74b	" to fly in air...	123.2	.....	.....	.....	92	148	..	.....	153	81	.....
75a	Last spring frost—hard...	140.5	.....	.....	....	129	149	.....	.....	144	89	.....
75b	" " hoar.	154.9	....	141	154	.....	.....	.....	.....	144	115	... ..
76a	Water in streams—highest	85.9	..	.....	..	.....	312	....	...	186	....	.....
76b	" " lowest	245.0	...	.....	....	...	330	.....	. ..	309	.....	.....
77a	First autumn frost—hoar..	264.7	.....	258	231	..	.....	.....	2 9	241	296	.....
77b	" " hard..	290 3	.....	289	....	.	...	.....	244	268	322	.....
78a	First snow to fly in air...	293.4	.....	298	....	.....	.....	.....	305	259	310	.....
78b	" whiten ground.	313.1	....	298	....		.....	.....	307	300	310	.....
79a	Closing of lakes,.....	346.5	.....		....	....	.....	.....	.....	311	....	.....
79b	" rivers.....	354.3	.....	345	344	....	.....	.....	.....	312	.....	.....
81a	Wild ducks migrating, N..	76.3	89	.....	.....	.....	.....	.....	97	82	.....	.....
81b	" " S..	295.1	.....	...	.....	.....	....	.....	305	300	.....	.....
82a	" geese " N..	76.1	73	60	62	98	.....	.....	96	89	.....	.....
82b	" " S..	310.3	....	.....	263	.....	319	. ..	307	300	.....	.....
83	Melospiza fasciata, North.	85 4	88	.....	90	74	.....	.....	120	.....	.....	.....

* When becoming common.

PHENOLOGICAL OBSERVATIONS, CANADA, 1902.

Observation Stations—When First Seen.

Number	Day of the year 1902 corresponding to the last day of each month. Jan..... 31 July.. .. 212 Feb..... 59 Aug.....243 March ... 90 Sept. ....273 April ...120 Oct.....304 May . 151 Nov.....334 June. ...181 Dec.....365	Average dates for Nova Scotia.	Woodstock, N.B.	Charlottetown, P.E.I. (1)	Charlottetown, P.E.I. (2)	Ottawa, Ont.	Beatrice, Muskoka, Ont.	Muskoka, Ont.	Pheasant Forks, Assa.	Blackfalds, Alberta.	Vancouver, B.C.	Average dates for British Columbia.
84	Turdus migratorius, North	78.3	79	87	93	74	84	.....	82	120	.....	.....
85	Junco hiemalis "	79 1	87	...	92	86	67	.....	88	.....	.....	.....
86	Actitis macularia "	124.0	.....	....	.....	106	.....	.....	.....	.....	.....	.....
87	Sturnella magna "	107.0	.... .	.....	.....	95	.....	.....	93	....	.....	.....
88	Ceryle Alcyon "	121.3	115	.....	.....	140	.....	.....	.....	.....	....	.....
89	Dendrœca coronata "	137.2	132	150	.....	....	...	.....	.....	.....	.....	.....
90	D. æstiva "	140.2	138	.....	....	126	....	.....	.. .	.....	.....	.....
91	Zonotrichia alba "	103.5	128	.....	.....	113	....	...	.....	.....	....	.....
92	Trochilus colubris "	146.1	140	.....	.....	137	..	.....	182	....	.....	.....
93	Tyrannus Carolinensis "	138.7	138	....	.....	140	.....	....	147	.....	.....	.....
94	Dolychonyx oryzivorus, North	132.9	138	....	.....	133	.....	.....	....	....	... .	.....
95	Spinis tristis "	132 8	1'8	.....	.....	130	....	.. .	.....	....	....	.....
96	Setophaga ruticilla "	127.7	142	.....	.....	130	.....	.....	.....	.....	....	.....
97	Ampelis cedrorum "	138.0	90	.....	.....	74	.....	....	.	.....	...	.....
98	Chordeiles Viginianus "	126.7	142	.....	143	142	.....	....	150	....	....	.....
99	First piping of frogs.....	91.1	103	104	101	84	91	.....	104	112	46	87
100	First appearance of snakes	101 7	.....	...	.....	91	110	....	117	135	...	.....

Flowering and other phenochrons for each region of the province of Nova Scotia, compiled from 300 public school observation schedules. [The phenochrons for each region (which are averages of many observations) have the fractions omitted].

WHEN FIRST SEEN—REGIONS.

Number.	Day of the year 1902 corresponding to the last day of each month. Jan. 31, Feb 59, March 90, April 120, May 151, June 181, July 212, Aug 243, Sept 273, Oct. 304, Nov 334, Dec. 365	Average for Province	1. Yarmouth and Digby	2. Shelburne, Queens and Lunenburg	3. Annapolis and Kings	4. Hants and S. Colchester	5. Halifax and Guysboro	6. S. Cobequid Slope (S. Cum. and Col.)	7. North Cum., Col., Pictou & Antig.	8. Richmond and Cape Breton	9. Bras d'Or Slope (Inv. & Victoria)	10. Inverness slope to Gulf.
1	Alnus incana, Willd	93.5	94	88	98	88	101	90	88	99	93	96
2	Populus tremuloides, Michx	103.5	108	105	108	94	....	98	102	99	105	111
3	Epigæa repens, L	94.9	86	88	90	92	90	101	101	98	98	103
4	Viola cucullata, Gray	119.1	113	117	115	117	121	118	120	125	121	124
5	V. blanda, Willd	116.9	110	114	115	115	115	115	117	123	121	123
6	Acer rubrum, L	117.1	118	115	116	111	116	115	117	124	123	117
7	Houstonia cærulea, L	131.8	136	127	130	132	125	127	....	....	....	146
8	Equisetum arvense, L	122.4	120	125	114	119	....	118	121	123	140	120
9	Taraxacum officinale, Weber	119.8	111	119	117	118	118	121	120	128	122	123
10	Erythronium Americanum	130.8	127	152	135	128	....	126	121	....	....	126
11	Hepatica triloba, Chaix	117.4	123	117	99	130	....	....	....	....	....	....
12	Coptis trifolia, Salisb	128 3	120	125	129	127	126	126	132	133	130	134
13	Fragaria Virginiana, Mill	117.6	116	119	114	116	117	116	119	122	119	118
14	" (fruit ripe)	†166.6	*157	163	157	164	167	165	167	178	175	172
15	Prunus Pennsylvanica, L	141.2	134	139	136	138	141	140	140	148	145	150
16	" (fruit ripe)	223.1	217	210	....	....	....	....	233	....	225	230
17	Vaccinium Penn. v. Can., Lam	141.0	129	131	137	137	137	141	143	152	151	150
18	" (fruit ripe)	207.1	192	186	193	238	....	195	218	212	221	208
19	Ranunculus acris, L	147.2	139	144	139	144	152	142	147	160	153	151
20	R. repens, L	155.3	145	143	153	153	157	158	157	161	162	164
21	Clintonia borealis, Raf	155.2	145	151	146	158	....	156	154	165	166	....
22	Trillium erythrocarpum, Mich	148.0	142	145	135	148	158	142	146	166	155	141
23	Trientalis Americanum, Pursh	147.4	139	144	135	148	150	148	148	163	151	147
24	Cypripedium acaule, Ait	158.4	151	152	151	157	159	164	160	168	161	....
25	Calla palustris, L	160.6	151	158	....	170	....	144	158	165	177	....
26	Amelanchier Canadensis, T.	138.8	137	135	133	134	139	139	135	151	143	141
27	" (fruit ripe)	194.0	191	191	....	....	....	....	204	....	189	....

* Last year the date here should have been 154 instead of "114," which was a clerical error.
† The "154" of last year here should have been 158.

Flowering and other phenochrons for each region of the province of Nova Scotia, compiled from 300 public school observation schedules. [The phenochrons for each region (which are averages of many observations) have the fractions omitted].

WHEN BECOMING COMMON—REGIONS.

Number.	Day of the year 1902 corresponding to the last day of each month. Jan. 31, Feb. 59, March 90, April 120, May 151, June 181, July 212, Aug. 243, Sept. 273, Oct. 304, Nov. 334, Dec. 365	Average for Province	1. Yarmouth and Digby	2. Shelburne, Queens and Lunenburg	3. Annapolis and Kings	4. Hants and S. Colchester	5. Halifax and Guysboro	6. S. Cobequid Slope (S. Cum. and Col.)	7. North Cum., Col., Pictou & Antig.	8. Richmond and Cape Breton	9. Bras d'Or Slope (Inv. & Victoria)	10. Inverness Slope to Gulf.
1	Alnus incana, Willd	101.0	107	96	103	98	....	103	95	104	99	102
2	Populus tremuloides, Michx.	112.3	120	118	114	101	....	110	106	112	111	118
3	Epigæa repens, L.	107.4	103	101	103	108	107	110	109	109	112	113
4	Viola cucullata, Gray	127.0	118	126	125	126	130	128	127	131	129	129
5	V. blanda, Willd	124.9	119	122	123	124	124	125	125	130	128	129
6	Acer rubrum, L.	123.8	125	122	121	119	124	124	123	129	128	123
7	Houstonia cærulea, L	139.3	....	134	135	144	138	133	....	....	....	151
8	Equisetum arvense, L.	130.2	133	132	125	126	....	129	127	134	137	128
9	Taraxacum officinale, Weber.	129.0	121	127	127	127	133	131	129	133	129	131
10	Erythronium Americanum	138.4	127	156	158	134	....	130	128	....	....	135
11	Hepatica triloba, Chaix	123.4	129	125	102	137	....	....	....	....	....	....
12	Coptis trifolia, Salisb.	135.3	129	131	133	134	136	134	139	139	138	140
13	Fragaria Virginiana, Mill.	129.2	123	129	124	127	132	129	130	129	140	129
14	" (fruit ripe)	178.4	174	176	173	177	179	174	180	186	184	182
15	Prunus Pennsylvanica, L.	147.6	141	146	144	144	150	145	146	153	151	156
16	" (fruit ripe)	228.8	231	212	....	....	....	....	237	....	234	230
17	Vaccinium Penn.v.Can., Lam	150.4	139	141	144	146	152	153	151	161	157	157
18	" (fruit ripe)	220.8	211	189	211	254	....	....	229	220	237	213
19	Ranunculus acris, L.	155.9	150	151	150	153	161	154	156	168	159	157
20	R. repens, L.	162.2	152	154	161	159	167	163	164	171	163	168
21	Clintonia borealis, Raf.	161.1	154	156	149	159	....	165	159	172	173	....
22	Trillium erythrocarpum, Mich	153.2	152	152	141	155	153	149	154	170	160	145
23	Trientalis Americanum, Pursh	154.7	149	153	146	153	154	157	152	170	158	155
24	Cypripedium acaule, Ait.	163.3	158	158	157	166	165	166	162	173	164	....
25	Calla palustris, L.	170.0	162	163	....	179	....	....	164	168	183	....
26	Amelanchier Canadensis, T.	145.3	144	141	139	141	146	144	142	159	150	147
27	" (fruit ripe)	210.6	212	207	....	....	....	....	213	....	210	....

Flowering and other phenochrons for each region of the province of Nova Scotia, compiled from 300 public school observation schedules. [The phenochrons for each region (which are averages of many observations) have the fractions omitted].

WHEN FIRST SEEN—REGIONS.

Number	Day of the year 1902 corresponding to the last day of each month. Jan. 31, Feb. 59, March 90, April 120, May 151, June 181, July 212, Aug. 243, Sept. 273, Oct. 304, Nov. 334, Dec. 365	Average for Province	1. Yarmouth and Digby	2. Shelburne, Queens and Lunenburg	3. Annapolis and Kings	4. Hants and S. Colchester	5. Halifax and Guysboro	6. S. Cobequid Slope (S. Cum. and Col.)	7. North Cum., Col., Pictou & Antig.	8. Richmond and Cape Breton	9. Bras d'Or Slope (Inv. & Victoria)	10. Inverness Slope to Gulf.
28	Rubus strigosus, Michx.	158.6	156	163	154	154	....	159	163	152	164	162
29	" (fruit ripe)	203.8	205	201	206	181	....	200	207	215	212	207
30	Rubus villosus, Ait.	166.1	165	165	164	160	169	165	176	....	160	170
31	" (fruit ripe)	232.7	231	216	225	238	....	225	234	....	253	239
32	Kalmia glauca, Ait.	151.4	144	145	147	146	....	151	158	167	161	142
33	K. angustifolia, L.	163.7	142	165	150	178	157	176	178	162	162	167
34	Cornus Canadensis, L.	152.4	144	149	144	149	156	151	150	161	156	163
35	" (fruit ripe)	216.1	245	203	....	221	....	....	203	....	211	213
36	Sisyrinchium angustifolium	158.5	152	154	151	154	158	157	157	175	163	163
37	Linnæa borealis, L.	168.6	160	159	159	164	168	171	172	175	179	178
38	Linaria Canadensis, Dum.	171.5	158	172	178	....	....	....	176	182	161	....
39	Rhinanthus Crista-galli, L.	170.5	166	168	165	170	....	171	175	....	170	178
40	Sarracenia purpurea, L.	165.2	160	163	165	154	....	....	166	173	174	....
41	Brunella vulgaris, L.	171.5	171	171	174	173	....	164	174	183	172	161
42	Epilobium angustifolium, L.	186.9	....	186	....	191	....	....	....	....	180	190
43	Rosa lucida, Ehrh.	181.5	182	178	175	182	....	183	179	....	187	185
44	Hypericum perforatum, L.	170.0	....	168	185	150	....	....	176	....	....	....
45	Leontodon autumnale, L.	169.6	162	165	167	168	172	171	170	176	173	....
46	Prunus Cerasus (cultiv.)	143.3	136	139	136	141	146	146	144	150	144	148
47	" (fruit ripe)	197.2	196	201	190	....	....	194	200	200	....	200
48	Cratægus Oxyacantha, L.	158.5	162	156	157	157	....	158	157	168	155	157
49	C. coccinea, L.	155.2	155	153	155	145	....	....	157	....	164	....
50	Prunus domestica (cultivated)	145.4	137	141	138	142	149	144	144	154	153	150
51	Pyrus malus (cultivated) early	147.6	141	143	142	145	152	147	147	157	150	153
52	" " late	155.8	150	150	148	155	159	155	157	163	160	160
53	Ribes rubrum (cultivated)	141.9	133	138	137	140	143	138	140	156	147	147
54	" (fruit ripe)	193.7	192	199	178	197	....	....	194	....	201	195

Flowering and other phenochrons for each region of the province of Nova Scotia, compiled from 300 public school observation schedules. [The phenochrons for each region (which are averages of many observations) have the fractions omitted].

WHEN BECOMING COMMON—REGIONS.

Number	Day of the year 1902 corresponding to the last day of each month. Jan ..... 31 Feb..... 59 March ..... 90 April.....120 May.....151 June.....181 July.....212 Aug..... 243 Sept.....273 Oct.....304 Nov ..... 334 Dec.....365	Average for Province	1. Yarmouth and Digby	2. Shelburne, Queens and Lunenburg	3. Annapolis and Kings	4. Hants and S. Colchester	5. Halifax and Guysboro	6. S. Cobequid Slope (S. Cum. and Col.)	7. North Cum., Col., Pictou & Antig.	8. Richmond and Cape Breton	9. Bras d'Or Slope (Inv. & Victoria)	10. Inverness Slope to Gulf.
28	Rubus strigosus, Michx.....	166.9	166	170	161	168	....	167	172	160	168	167
29	" (fruit ripe).....	218.0	227	218	213	....	....	212	213	220	222	217
30	Rubus villosus, Ait	173.9	175	173	173	171	....	172	180	....	169	177
31	" (fruit ripe).....	241.4	246	229	236	246	....	228	239	....	263	244
32	Kalmia glauca, Ait	157.5	152	151	155	153	....	153	163	170	166	155
33	K. angustifolia, L....	170.1	151	171	157	182	163	182	185	168	168	173
34	Cornus Canadensis, L.....	160.6	154	160	152	158	166	159	158	167	166	167
35	" (fruit ripe).....	225.1	249	207	....	229	....	....	228	....	219	218
36	Sisyrinchium angustifolium..	166.4	161	161	158	162	166	166	166	181	170	171
37	Linnæa borealis, L.....	174.5	167	166	164	169	176	178	178	181	185	182
38	Linaria Canadensis, Dum ...	176.4	170	171	182	....	....	....	179	186	170	....
39	Rhinanthus Crista-galli, L....	177.8	173	174	175	176	....	176	180	....	187	180
40	Sarracenia purpurea, L.....	173.8	182	169	172	159	....	173	....	182	179	....
41	Brunella vulgaris, L.....	180.0	190	177	176	179	....	180	182	188	168	....
42	Epilobium angustifolium, L..	198.0	206	187	....	200	....	....	....	....	197	199
43	Rosa lucida, Ehrh.	192.6	202	184	180	186	....	204	187	....	201	196
44	Hypericum perforatum, L....	173.5	....	163	190	155	....	186	....	....	....	....
45	Leontodon autumnale, L.....	177.4	....	173	173	177	182	177	176	173	186	....
46	Prunus Cerasus (cultiv.)	149.6	142	146	143	148	156	151	149	155	151	154
47	" (fruit ripe).....	210.4	213	212	199	....	...	220	206	210	....	212
48	Cratægus Oxyacantha, L.....	164.9	169	164	162	164	....	165	165	174	161	161
49	C. coccinea, L.	162.7	168	160	161	152	....	....	164	....	170	....
50	Prunus domestica (cultivated)	151.5	143	148	146	148	154	149	150	162	160	156
51	Pyrus malus (cultivated) early	154.1	150	150	148	151	158	153	152	164	157	159
52	" " late	161.8	160	156	156	160	....	160	162	171	166	164
53	Ribes rubrum (cultivated)....	147.9	138	144	142	146	150	146	148	163	154	149
54	" (fruit ripe).....	205.6	212	207	182	228	....	....	200	....	205	205

Flowering and other phenochrons for each region of the province of Nova Scotia, compiled from 300 public school observation schedules. [The phenochrons for each region (which are averages of many observations) have the fractions omitted].

WHEN FIRST SEEN—REGIONS.

Number.	Day of the year 1902 corresponding to the last day of each month. Jan. 31, Feb 59, March 90, April 120, May 151, June 181, July 212, Aug. 243, Sept. 273, Oct. 304, Nov. 334, Dec. 365	Average for Province	1. Yarmouth and Digby	2. Shelburne, Queens and Lunenburg	3. Annapolis and Kings	4. Hants and S. Colchester	5. Halifax and Guysboro	6. S. Cobequid Slope (S. Cum. and Col.)	7. North Cum., Col., Pictou & Antig.	8. Richmond and Cape Breton	9. Bras d Or Slope to (Inv. & Victoria).	10. Inverness Slope to Gulf
55	R. nigrum (cultivated)	142.9	143	141	131	140	145	138	141	157	152	141
56	" (fruit ripe)	207.1	210	200	....	221	....	....	205	....	201	203
57	Syringa vulgaris, L. (cultiv.)	160.8	157	157	153	159	165	159	160	172	165	162
58	Solanum tuberosum, L.	185.9	177	182	179	185	....	185	187	205	187	....
59	Phleum pratense, L.	177.9	176	162	171	175	168	187	177	180	190	192
60	Trifolium repens, L.	162.6	155	159	158	158	164	160	162	172	165	172
61	T. pratense, L.	159.5	149	145	154	158	154	159	162	172	164	169
62	Triticum vulgare, L.	205.0	....	....	....	....	....	....	203	....	207	....
63	Avena sativa, L.	210.7	202	199	....	....	....	....	....	....	203	....
64	Fagopyrum esculentum, L.	194.9	210	196	191	180	....	198	....	....	....	194
65a	Earliest full leafing of tree	137.5	131	136	135	137	....	146	142	....	135	....
65b	Latest " "	165.2	158	163	161	163	....	174	162	....	166	175
66	Ploughing (first of season)	104.6	90	104	101	107	120	105	112	101	105	100
67	Sowing " "	117.2	105	113	116	128	115	115	118	115	125	120
68	Potato-planting "	115.1	103	111	119	123	111	122	119	109	118	115
69	Sheep-shearing "	125.5	130	124	125	140	124	125	131	130	116	109
70	Hay-cutting "	192.9	183	183	185	190	....	190	191	213	201	200
71	Grain-cutting "	231.0	236	232	216	229	....	227	226	254	235	224
72	Potato-digging "	258.3	255	254	251	254	251	256	264	280	266	250
73a	Opening of rivers "	72.7	68	65	69	90	....	72	79	60	84	68
73b	Opening of lakes "	78.9	69	78	76	96	....	80	79	79	82	72
74a	Last snow to whiten ground	103.0	97	96	98	96	97	96	102	107	119	123
74b	" to fly in air	123.2	111	116	124	123	115	121	129	128	132	132
75a	Last spring frost—hard	140.5	145	139	142	139	....	146	141	138	137	137
75b	" " hoar	154.9	161	139	154	164	....	158	156	157	155	150
76a	Water in streams—highest	85.9	92	79	80	110	....	87	84	84	84	72
76b	" " lowest	245.0	254	253	207	245	....	266	251	250	236	242

Flowering and other phenochrons for each region of the province of Nova Scotia, compiled from 300 public school observation schedules. [The phenochrons for each region (which are averages of many observations) have the fractions omitted].

WHEN BECOMING COMMON—REGIONS.

Number	Day of the year 1902 corresponding to the last day of each month. Jan. 31, Feb 59, March 90, April 120, May 151, June 181, July 212, Aug. 243, Sept. 273, Oct. 304, Nov. 334, Dec 365	Average for Province	1. Yarmouth and Digby	2. Shelburne, Queens and Lunenburg	3. Annapolis and Kings	4. Hants and S. Colchester	5. Halifax and Guysboro	6. S. Cobequid Slope (S. Cum. and Col.)	7. North Cum., Col., Pictou & Antig.	8. Richmond and Cape Breton	9. Bras d'Or Slope (Inv. & Victoria.)	10. Inverness Slope to Gulf.
55	R. nigrum (cultivated)	149.4	147	146	145	147	151	146	147	162	157	146
56	" (fruit ripe)	214 2	219	205	....	227	....	....	210	....	209	214
57	Syringa vul., L. (cultivated)	167.9	165	163	161	165	172	164	166	178	174	171
58	Solanum tuberosum, L.	198.5	187	188	....	198	....	....	211	212	200	193
59	Phleum pratense, L.	179.3	163	168	178	183	175	156	188	190	195	197
60	Trifolium repens, L.	170.3	164	167	165	168	171	167	171	176	175	178
61	T. pratense, L	168.7	159	163	164	166	168	170	170	179	173	176
62	Triticum vulgare, L.	210.8	....	....	....	....	....	....	208	....	213	....
63	Avena sativa, L.	212.3	226	203	....	....	....	....	....	....	207	...
64	Fagopyrum esculentum, L.	204.6	207	199	206	....	....	206	....	....	....	....
65a	Earliest full leafing of tree	....	....	....	....	....	....	....	....	....	....	....
65b	Latest " "	....	....	....	....	....	....	....	....	....	....	....
66	Ploughing (first of season)	117.9	108	116	116	119	141	117	121	111	121	109
67	Sowing " "	126.3	119	126	129	125	125	121	128	128	132	128
68	Potato-planting "	128.9	130	123	136	136	124	137	130	121	129	123
69	Sheep-shearing "	138.9	145	135	141	149	143	136	150	142	128	122
70	Hay-cutting "	201.4	192	192	190	207	....	198	200	218	207	208
71	Grain-cutting "	239.3	242	238	229	239	236	237	238	259	242	232
72	Potato-digging "	269.3	264	269	266	266	265	268	272	279	272	272

Flowering and other phenochrons for each region of the province of Nova Scotia, compiled from 300 public school observation schedules. [The phenochrons for each region (which are averages of many observations) have the fractions omitted].

WHEN FIRST SEEN—REGIONS.

Number.	Day of the year 1902 corresponding to the last day of each month. Jan ..... 31 Feb ..... 59 March ..... 90 April..... 120 May ..... 151 June ..... 181 July ..... 212 Aug ..... 243 Sept ..... 273 Oct..... 304 Nov..... 334 Dec..... 365	Average for Province	1. Yarmouth and Digby	2. Shelburne, Queens and Lunenburg	3. Annapolis and Kings	4. Hants and S. Colchester	5. Halifax and Guysboro	6. S. Cobequid Slope (S. Cum. and Col.)	7. North Cum., Col., Pictou & Antig.	8. Richmond and Cape Breton	9. Bras d'Or Slope (Inv. & Victoria).	10. Inverness Slope to Gulf.
77a	First autumn frost, hoar.....	264.7	262	262	270	254	262	256	266	279	264	271
77b	" " hard.....	290.3	293	283	301	290	284	285	285	302	285	295
78a	First snow to fly in air.....	293.4	297	291	292	288	297	290	292	306	284	296
78b	" whiten ground....	313.1	310	315	315	322	317	303	308	317	313	311
79a	Closing of Lakes.....	346.5	323	344	342	341	....	....	352	357	350	362
79b	" Rivers.....	354.3	334	369	345	....	....	324	375	387	....	346
81a	Wild ducks migrating, N.....	76.3	67	82	77	76	68	69	75	84	80	83
81b	" " " S.....	295.1	268	299	300	311	....	278	286	270	314	329
82a	" geese " N.....	76.1	81	81	76	77	64	71	68	80	85	77
82b	" " " S.....	310.3	314	333	320	302	316	293	311	....	313	291
83	Melospiza fasciata, North.....	85.4	81	86	93	89	87	76	82	78	95	87
84	Turdus migratorius "	78.3	74	77	71	78	78	75	76	76	87	90
85	Junco hiemalis "	79.1	70	88	68	80	76	76	....	84	....	90
86	Actitis macularia "	124.0	99	127	112	118	134	124	138	116	124	147
87	Sturnella magna "	107.0	122	109	122	97	....	74	....	112	113	108
88	Ceryle Alcyon "	121.3	118	127	131	123	115	115	122	118	103	140
89	Dendrœca coronata "	137.2	112	138	135	147	144	141	....	....	142	138
90	D. æstiva "	140 2	133	138	137	151	143	136	147	138	138	141
91	Zonotrichia alba "	103.5	111	96	101	106	104	108	80	110	105	11
92	Trochilus colubris "	146.1	143	143	140	142	142	141	145	153	155	156
93	Tyrannus Carolinensis"	138.7	....	164	136	134	....	125	139	...	146	128
94	Dolychonyx oryzivorus"	132.9	....	146	131	136	....	135	145	123	120	126
95	Spinis tristis "	132.8	....	148	136	132	138	136	....	119	121	132
96	Setophaga ruticilla "	127.7	....	106	155	123	....	151	....	94	136	....
97	Ampelis cedrorum "	138.0	....	152	....	156	....	120	....	130	....	131
98	Chordeiles Viginianus "	126.7	133	128	128	129	127	129	....	102	125	138
99	First piping of frogs..	91.1	83	82	86	89	92	92	91	96	102	98
100	First appearance, snakes.....	101.7	86	90	100	102	101	108	102	111	108	108

THUNDERSTORMS—PROVINCE OF NOVA SCOTIA—Regions 1 to 10.

Observation Stations—Year 1901.

1. Yarmouth and Digby.	2. Shelb'ne, Queens and Lunenburg.	3. Annapolis and Kings.	4. Hants and South Colchester.	5. Halifax and Guysboro.	6. S. Cobequid Slope (S. Cum. & Col.)	7. North Cum., Col., Pictou & Antig.	8. Richmond and Cape Breton.	9. Bras d'Or Slope (Inv. & Victoria).	10. Inverness Slope to Gulf.
237[5]	237[6]	237[2]	237[2]	237[1]					
			238[2]			238[1]			
245[1]		244[1]							
246[4]	246[1]								
247[1]		247[1]							
250[2]	250[1]	250[2]	250[1]		250[2]	250[3]	250[1]		
		251[2]	251[3]	251[2]	251[10]	251[22]	251[2]	251[2]	251[1]
	255[1]			255[1]		252[1]	252[1]	252[1]	253[2]
256[1]	257[1]	256[1]	256[1]			256[9]	256[3]	256[2]	256[2]
	258[3]	258[4]				258[1]		258[1]	257[1]
259[2]		259[2]		259[2]		259[1]			
260[1]	265[1]			261[1]		265[1]			
273[1]	268[1]		273[1]						
	279[1]								
			287[1]						
288[1]				288[1]					
						290[2]		290[1]	
		304[1]							304[1]
314[1]									
							319[3]		

Observation Stations, Year 1901.

1. Yarmouth and Digby.	2. Shelb'ne, Queens and Lunenburg.	3. Annapolis and Kings.	4. Hants and South Colchester.	5. Halifax and Guysboro.	6. S. Cobequid Slope (S. Cum. & Col.)	7. North Cum., Col., Pictou & Antig.	8. Richmond and Cape Breton.	9. Bras d'Or Slope (Inv. & Victoria).	10. Inverness Slope to Gulf.
			182[1]	182[1]	182[2]	182[17]			182[1]
		183[1]	183[1]			183[6]	183[1]		
	189[1]	189[2]				189[3]			
	190[2]							190[1]	
	191[1]				192[2]				
	196[2]	196[2]			196[2]			196[1]	196[1]
	197[1]	197[1]			197[4]	197[2]		199[2]	
198[1]	198[1]					198[2]			
	199[1]								
	201[1]								
	202[1]								
203[1]								203[2]	203[1]
	204[1]								
205[1]								205[1]	
						208[1]			
						209[1]			
212[1]	212[1]	212[1]	212[1]			212[2]		212[1]	212[1]
						215[1]		213[1]	213[1]
			218[1]						
						219[1]			
220[1]	220[1]	220[1]			220[2]			221[2]	221[2]
		222[1]						222[1]	
		223[1]					227[1]		223[1]
						228[2]		228[1]	228[2]
			229[1]						
						230[1]			
	231[1]								
	235[2]								

The index figure above indicates the number of stations from which thunder was reported.

THUNDERSTORMS—PROVINCE OF NOVA SCOTIA—Regions 1 to 10.

Observation Stations—Year 1902.

1. Yarmouth and Digby.	2. Shelb'ne, Queens and Lunenburg.	3. Annapolis and Kings.	4. Hants and South Colchester.	5. Halifax and Guysboro.	6. S. Cobequid Slope (S. Cum. & Col.)	7. North Cum., Col., Pictou & Antig.	8. Richmond and Cape Breton.	9. Bras d'Or Slope (Inv. & Victoria).	10. Inverness Slope to Gulf.
129^{1}	129^{8}	.....	.....	.....	.....	.....	.....	.....	.....
.....	130^{1}	.....	130^{1}	.....	.....	.....	.....	.....	.....
.....	.....	.....	133^{1}	.....	.....	141^{3}	141^{1}	133^{1}	.....
.....	.....	.....	142^{2}	.....	142^{2}	142^{2}	.....	139^{1}	.....
143^{2}	143^{3}	143^{25}	143^{0}	.....	143^{9}	143^{27}	143^{2}	143^{1}	143^{2}
144^{8}	144^{38}	144^{5}	144^{14}	144^{16}	144^{3}	144^{11}	144^{5}	144^{6}	144^{3}
145^{1}	145^{7}	.....	.....	.....	.....	145^{1}	145^{1}	145^{3}	145^{2}
.....	146^{1}	.....	146^{2}	.....	.....	147^{1}	146^{1}	.....	.....
.....	.....	.....	.....	.....	148^{1}	148^{2}	148^{1}	.....	.....
.....	.....	.....	.....	.....	152^{1}	151^{2}	.....	.....	.....
.....	.....	153^{1}	153^{5}	153^{1}	153^{13}	.....	.....	153^{1}	.....
154^{4}	154^{9}	154^{1}	154^{1}	.....	154^{2}	.....	154^{3}	.....	.....
155^{6}	155^{37}	.....	155^{4}	155^{15}	155^{1}	.....	155^{3}	.....	155^{2}
157^{3}	156^{1}	.....	.....	.....	.....	.....	.....	.....	156^{1}
160^{1}	158^{1}	161^{2}	158^{1}	.....	.....	.....	.....	.....	157^{1}
161^{2}	159^{1}	162^{1}	.....	.....	162^{1}	.....	162^{1}	.....	.....
164^{1}	162^{3}	164^{1}	.....	.....	.....	.....	.....	.....	.....
166^{1}	166^{2}	.....	.....	.....	.....	.....	.....	.....	.....
167^{6}	167^{15}	167^{2}	.....	167^{4}	.....	.....	.....	.....	.....
168^{5}	168^{6}	168^{3}	168^{5}	168^{9}	168^{1}	168^{6}	.....	.....	.....
.....	170^{1}	.....	.....	.....	169^{1}	169^{2}	.....	169^{1}	.....
.....	171^{26}	171^{9}	.....	170^{1}	.....	171^{1}	.....	171^{1}	.....
.....	173^{1}	172^{1}	.....	.....	.....	173^{1}	.....	.....	.....
.....	174^{1}	173^{1}	.....	.....	.....	174^{3}	.....	174^{1}	174^{1}
175^{1}	175^{1}	.....	175^{7}	175^{4}	.....	175^{29}	.....	175^{6}	175^{2}
.....	176^{38}	176^{2}	176^{16}	176^{8}	.....	176^{7}	176^{1}	176^{3}	176^{5}
177^{2}	.....	177^{5}	177^{1}	.....	.....	178^{4}	.....	177^{2}	177^{1}
.....	.....	.....	179^{1}	.....	179^{1}	181^{1}	.....	178^{1}	.....

Observation Stations, Year 1902.

1. Yarmouth and Digby.	2. Shelb'ne, Queens and Lunenburg.	3. Annapolis and Kings.	4. Hants and South Colchester.	5. Halifax and Guysboro.	6. S. Cobequid Slope (S. Cum. & Col.)	7. North Cum., Col., Pictou & Antig.	8. Richmond and Cape Breton.	9. Bras d'Or Slope (Inv. & Victoria).	10. Inverness Slope to Gulf.
33^{3}	49^{1}	.....	34^{1}	.....	.....	42^{1}	.....	.....	.....
.....	68^{1}	.....	.....	.....	.....	.....	.....	.....	.....
.....	77^{1}	.....	.....	.....	.....	71^{1}	.....	.....	.....
.....	78^{1}	81^{2}	80^{1}	.....	.....	87^{1}	.....	89^{1}	89^{1}
.....	85^{1}	90^{1}	.....	90^{1}	88^{1}	88^{1}	90^{1}	90^{3}	90^{2}
.....	92^{1}	.....	92^{1}	.....	92^{5}	.....	91^{4}	91^{3}	91^{3}
.....	94^{1}	.....	.....	.....	93^{1}	.....	.....	.....	.....
.....	96^{1}	.....	96^{1}	.....	.....	.....	.....	96^{1}	.....
.....	99^{19}	99^{1}	.....	.....	.....	.....	.....	.....	.....
.....	100^{2}	101^{1}	.....	.....	.....	101^{1}	.....	.....	.....
.....	103^{38}	103^{11}	.....	103^{1}	103^{1}	.....	.....	.....	.....
.....	104^{1}	.....	.....	.....	104^{1}	.....	.....	.....	.....
.....	105^{1}	.....	.....	.....	.....	.....	.....	.....	.....
.....	106^{1}	.....	.....	.....	.....	.....	.....	.....	.....
.....	107^{1}	.....	.....	.....	.....	107^{1}	.....	.....	.....
.....	.....	.....	109^{1}	.....	.....	109^{3}	.....	.....	.....
.....	110^{1}	.....	.....	.....	110^{1}	110^{2}	.....	.....	.....
111^{1}	.....	111^{2}	.....	.....	111^{3}	111^{30}	.....	.....	.....
112^{1}	112^{45}	112^{13}	.....	.....	.....	112^{2}	.....	.....	.....
.....	.....	113^{1}	.....	.....	.....	113^{1}	113^{1}	113^{2}	.....
114^{1}	.....	.....	.....	.....	.....	114^{6}	114^{1}	114^{3}	.....
.....	.....	.....	115^{1}	.....	.....	115^{3}	.....	.....	115^{2}
116^{17}	116^{34}	116^{21}	116^{18}	116^{7}	116^{19}	116^{60}	116^{1}	116^{2}	116^{4}
117^{1}	117^{1}	117^{2}	117^{3}	.....	117^{6}	117^{3}	.....	117^{3}	117^{1}
.....	.....	.....	.....	118^{1}	.....	118^{1}	.....	.....	118^{1}
126^{1}	121^{1}	123^{1}	.....	.....	.....	120^{1}	.....	.....	.....
127^{7}	127^{17}	125^{1}	.....	.....	.....	127^{1}	.....	.....	.....
.....	.....	128^{2}	128^{1}	.....	.....	128^{1}	.....	.....	.....

The index figure above indicates the number of stations from which thunder was reported.

PHENOLOGICAL OBSERVATIONS, BRITISH COLUMBIA, 1902.

When First Seen — Observation Stations: Comox	Beaver Creek Alberni	Squamish	Alder-grove.	Chilliwack	Average dates of Coast Belt.	Province British Columbia Belt (1) Island and Coast—Year, 1902.	When Becoming Common — Average dates of Coast Belt.	Observation Stations: Comox	Beaver Creek Alberni	Squamish	Alder-grove.	Chilliwack.
						Day of the year corresponding to the last day of each month. Jan. 31 July 212; Feb. 59 Aug. 242; March 90 Sept. 273; April 120 Oct. 304; May 151 Nov. 334; June 181 Dec. 365						
				156	156	1. Crataegus oxyacantha						
103		114	108	118	113·3	2. Pyrus malus, flowering						
		233		216	224·5	3. " " fr. ripe						
74		100	97	104	93·7	4. Ribes rubrum, flowering						
		164			164	5. " " fr. ripe						
123		135	132	127	129·2	6. Syringa vulgaris						
144		155	156	162	154·2	7. Solanum tuberosum						
139		182	156	188	165·7	8. Phleum pratense						
117		126	124	127	123·5	9. Trifolium repens						
127		139	133		133	10. T. pratense						
			167		167	11. Triticum vulgare, fl.						
				221	221	12. " " ripe						
						13. Avena sativa, fl						
		232		224	228	14. " ripe						
74					74	15. Alnus rubra	83.5				93	74
						16. Populus tremuloides						
		85		56	70·5	17. Salix ——	70.5				75	66
79		113		106	99 3	18. Fragaria —— fl.	114					114
						19. " ripe						
						20. Rubus strigosus fl.						
				188	188	21. " " ripe						
			91	75	83	22. Corylus rostrata	79					79
96					96	23. Calypso borealis						
124				124	124	24. Vacinium —— fl.	126					126
						25. " ripe						
81			146	127	118	26. Ranunculus ——	131					131
		130	127		128·5	27. Amelanchier alnifolia						
111	138	131	125		126·5	28. Cornus nuttali						
		143			143	29. Lilium Columbianum						
93					93	30. Linnæa borealis						
		155			155	31. Brunella vulgaris						
				169	169	32. Epilobium angustifolium	173					173
137	146	146	129	141	139·8	33. Rosa ——	144					144
						34. Solidago ——						
60	74	75		61	67·5	35. Piping of Frogs						
		94		95	94·5	36. Last snow						

PHENOLOGICAL OBSERVATIONS, BRITISH COLUMBIA, 1902.

Coast average (1), Dry Belt (2), and Mountains (3), with average of (1), (2) and (3) for the whole province.

Day of the year 1902 corresponding to the last day of each month.

Jan.	31	July	212
Feb.	59	Aug.	243
March	90	Sept.	273
April	120	Oct.	304
May	151	Nov.	334
June	181	Dec.	365

	When First Seen.									When Becoming Common.								
	(2) Dry Belt.			(3) Mountain Belt.				(1)	(1) (2) (3)	(1) (2) (3)	(1)	(2) Dry Belt			(3) Mountain Belt			
	Grand Prairie.	Cache Creek.	Average.	Salmo.	Revelstoke.	N.F. Kettle River.	Average.	Average of Coast Phenochrons.	Average of the Phenochrons of the three Belts.	Average of Phenochrons of the three Belts.	Average of Coast Phenochrons	Average.	Grand Prairie.	Cache Creek.	Average.	Salmo.	Revelstoke.	N. F. Kettle River.
1 Hawthorn	.....	.....	.....	.....	.....	146	146	156.	151.	150.	.....	.....	.....	.....	150.	.....	.....	150
2 Apple, fl	132	.....	132.	.....	136	145	140.5	113.3	128.6	148.	.....	.....	.....	.....	148.	.....	.....	148
3 " ripe	.....	.....	.....	.....	.....	.....	.....	224 5	224 5	.....	.....	.....	.....	.....	.....	.....	.....	.....
4 R. Currant, fl	117	117	117.	.....	119	143	131.	93.7	113.9	147.	.....	.....	.....	.....	147.	.....	.....	147
5 " ripe	.....	.....	.....	.....	.....	.....	.....	164.	164.	.....	.....	.....	.....	.....	.....	.....	.....	.....
6 Lilac	133	130	131.5	.....	129	145	137.	129.2	132.6	149.	.....	.....	.....	.....	149.	.....	.....	149
7 Potato	.....	166	166.	.....	160	193	176.5	154.2	165.6	.....	.....	.....	.....	.....	.....	.....	.....	.....
8 Timothy	193	.....	193.	.....	160	193	176.5	165.7	178.4	.....	.....	.....	.....	.....	.....	.....	.....	.....
9 White Clover	142	147	144.5	.....	123	166	144.5	123.5	137.5	.....	.....	.....	.....	.....	.....	.....	.....	.....
10 Red Clover	142	146	144.	.....	149	166	157.5	133.	144.8	.....	.....	.....	.....	.....	.....	.....	.....	.....
11 Wheat, fl	.....	.....	.....	.....	.....	193	193.	167.	180.	.....	.....	.....	.....	.....	.....	.....	.....	.....
12 " ripe	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
13 Oats, fl	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
14 " ripe	.....	.....	.....	.....	.....	.....	.....	228.	228.	.....	.....	.....	.....	.....	.....	.....	.....	.....
15 Red Alder	.....	.....	.....	141	.....	146	143.5	74	108.7	229.	.....	.....	.....	.....	229.	.....	229	.....
16 Poplar	.....	.....	.....	.....	.....	.....	.....	.....	.....	83.5	83.5	.....	.....	.....	.....	.....	.....	.....
17 Willow	97	92	94 5	95	92	79	88.6	70.5	84 5	.....	.....	.....	.....	.....	.....	.....	.....	.....
18 Strawberry, fl	101	108	104.5	102	119	93	104.6	99.3	102.8	85.2	70.5	.....	.....	.....	100.	102	100	97
19 " ripe	.....	.....	.....	.....	153	.....	153.	.....	153.	117.5	114.	117.	117	.....	121.5	116	.....	127
20 Raspberry, fl	.....	.....	.....	153	142	130	141.6	.....	141.6	153.	.....	.....	.....	.....	153.	.....	153	.....
21 " ripe	.....	.....	.....	.....	188	220	204.	188.	196.	148.	.....	.....	.....	.....	148.	.....	161	135
22 Hazel	.....	.....	.....	.....	.....	91	91.	83.	87.	213.	.....	.....	.....	.....	213.	.....	213	.....
23 Calypso	140	152	146.	.....	129	122	123.5	96.	121.8	88.2	79.	.....	.....	.....	97.5	95	.....	100
24 Blueberry, fl	.....	.....	.....	.....	119	145	132.	124.	128.	136.	.....	145.	145	.....	127.	.....	.....	127
25 " ripe	.....	.....	.....	.....	198	173	185.5	.....	185.5	133.	126.	.....	.....	.....	140.	.....	130	150
26 Buttercup	.....	.....	.....	143	147	74	121.3	118.	119.6	213.	.....	.....	.....	.....	213.	.....	213	.....
27 Serviceberry	115	.....	115.	131	127	123	127.	128.5	123.5	129.7	131.	.....	.....	.....	128.5	.....	166	91
28 Dogwood	.....	.....	.....	148	132	.....	140.	126.5	133.2	111.5	.....	120.	120	.....	103.	.....	135	71
29 Lily	.....	.....	.....	.....	154	121	137.5	143.	140.2	137.	.....	.....	.....	.....	137.	.....	137	.....
30 Twinflower	152	.....	152.	.....	167	.....	167.	93.	137.3	150.	.....	.....	.....	...	150.	.....	172	127
31 Brunella	.....	.....	.....	.....	182	227	204.5	155.	179.7	178.	.....	.....	.....	.....	178.	.....	178	.....
32 Fireweed	167	.....	167.	.....	195	.....	195.	169.	177.	196.	.....	.....	.....	.....	196.	.....	196	.....
33 Wild Rose	150	142	146.	125	157	144	142.	139.8	142.6	200.	173.	.....	.....	.....	227.	.....	227	.....
34 Golden Rod	210	.....	210.	.....	199	.....	199.	.....	204.5	154.3	144.	152.	152	.....	167.	.....	182	152
35 Frogs piping	105	108	106.5	94	103	64	87.	67.5	87.	217.	.....	.....	.....	.....	217	.....	217	.....
36 Last snow	110	102	106.	.....	102	86	94.	94.5	98.2	.....	.....	.....	.....	.....	.....	.....	.....	.....

SOCIÉTÉ ROYALE DU CANADA

MÉMOIRES

SECTION I.

LITTÉRATURE FRANÇAISE, HISTOIRE, ARCHÉOLOGIE, ETC

ANNÉE 1903

I.—*Découverte du Mississipi en 1659.*

Par M. Benjamin Sulte.

(Lu le 20 mai 1903.)

Sommaire:—1650, dispersion de dix-sept bourgades de Hurons et des Outaouas de Manitoualine; les Hurons du Petun avec une tribu d'Outaouas se réfugient à la baie Verte.—1653, trois canots de ces gens vont par le nord et le Saint-Maurice jusqu'aux Trois-Rivières et annoncent qu'ils veulent rouvrir la traite avec les Français.—1654, ils descendent en bande sur le Saint-Laurent et repartent avec deux Français; à l'automne, les Iroquois attaquent leur fort dans la baie Verte.—1655, les Outaouas et les Hurons du Petun traversent le Wisconsin et s'établissent sur le Mississipi, à l'île Pelée, dans le lac Pepin. —1656, les deux voyageurs (noms inconnus) de 1654 reviennent de la baie Verte.—1657, par crainte des Sioux, les Hurons du Petun remontent la rivière Noire et s'arrêtent non loin du lac Supérieur.—les Outaouas vont se fixer à Kionconan, rive sud-est du lac Supérieur.—1658, les sauvages du lac Supérieur et de la baie Georgienne étant descendus aux Trois-Rivières, Chouart et Radisson les accompagnent au retour et vont hiverner dans la baie Verte. Au printemps de 1659, tous deux se rendent en haut de la rivière aux Renards, chez les Mascoutins, où Chouart s'arrête tandis que Radisson descend la rivière Wisconsin, entre dans le Mississipi, visite le lac Pepin, l'île Pelée, puis explore les rivières de l'est et de l'ouest, espérant découvrir le vrai pays du castor. Il pense que "la grande rivière" aboutit au Mexique. Après quatre mois de courses, il retrouve Chouart chez les Mascoutins et tous deux suivent la rivière aux Renards, revoient la baie Verte, entrent dans le lac Michigan, passent le détroit de Michillimakinac et arrivent au saut Sainte-Marie à l'automne. Au commencement de la saison des neiges, ils sont à l'extrémité ouest du lac Supérieur et vont durant l'hiver chez les Sioux au sud de Chagouamigon. Vers le printemps de 1660, ils retournent au lac Supérieur, prennent la rivière des Malomines et séjournent à la baie Verte jusqu'à la seconde moitié de juillet où ils partent pour le Canada. Ils décident que le Mississipi ne vaut pas le lac Supérieur pour le commerce du castor.

I

"Les Français ayant découvert ce pays firent savoir de nation en nation leur établissement. Les Algonquins demeuraient le long de la rivière des Outaouas, au Nipissing, dans la rivière des Français et entre icelle et Toronto,[1] et les Hurons dans leur ancien pays." (Mémoire de Nicolas Perrot, 9, 80.)

Pour l'intelligence de ce qui va suivre mettons les choses sous une autre forme.

La rive nord du Saint-Laurent, de Tadoussac à Montréal, était occupée par des tribus de langue algonquine: les Montagnais du Saguenay, qui se répandaient vers les Trois-Rivières; les Attikamègues du Saint-Maurice rôdant jusqu'à l'Ottawa, la baie James, le Saint-Laurent; les Algonquins de l'Ottawa dont le pays était aussi bien Machiche et les Trois-Rivières.

Ces derniers se subdivisaient en trois peuples localisés sur la rivière dite des Algonquins; les Iroquets, de Vaudreuil à la ville actuelle d'Ottawa; la Petite-Nation, à Papineauville; les Grands Algonquins, à l'île des Allumettes. Le nom de rivière des Algonquins disparut après 1650 parce que les Iroquois en avaient chassé tous les habitants. C'est à cette date que notre narration commence.

Les indigènes du lac Nipissing s'étaient vus décimés comme les autres en 1650; ceux qui restaient, réfugiés au nord, s'alliaient aux tribus de la baie d'Hudson. Nicolas Perrot (p. 81) note que "les Nepissings tinrent ferme quelques années dans leurs villages, mais il leur fallut ensuite fuir dans le fond du nord à Alimebegon," cependant le père Paul Ragueneau (*Relation*, 1650, pp. 22, 26) dit que le massacre eut lieu au printemps de 1650 et qu'il en a relevé les traces au mois de juin suivant: "Le lac (Nepissing) que j'avais vu autrefois habité quasi tout le long de ses côtes, n'est plus rien qu'une solitude." La *Relation* de 1667, p. 24, porte que ces pauvres gens se réfugièrent "au lac Alimibegong qui n'est qu'à cinquante ou soixante lieues de la mer du nord." C'est le lac Nipigon.

Champlain, écrivant leur nom en 1613, l'épelle: Nebicerini, et ailleurs; Nipisierinij. Sagard en 1624 met: Epicerinys. Les *Relations* adoptent le plus souvent Nipissiriniens, et parfois Bissiriniens — en langue algonquine: les Sorciers. Les Hurons les nommaient Squierhonons, Squekaneronons, Askic8aneronons, Askik8anchronons, Askiquaneronons — ce qui veut dire encore les Sorciers.

Les Algonquins de l'île des Allumettes ne les aimaient pas, non parce qu'ils étaient en rapport avec des influences diaboliques, mais à

[1] Aujourd'hui nous disons lac Simcoe.

cause de leur talent pour le négoce. Avant l'arrivée des Français, ces coureurs de bois faisaient la traite à de grandes distances au nord, à l'ouest, au sud. Ils entretenaient des rapports constants avec les Hurons de Penetanguishine, tout en disant que ces derniers avaient moins d'esprit que les autres sauvages. On accorde aux Nipissiriniens des facultés intellectuelles supérieures à celles de leurs voisins. Jean Richer et Jean Nicolet vivaient parmi eux entre les années 1622 et 1632. A partir de 1633 ou les voit à la traite des Trois-Rivières. Les missionnaires, qui les fréquentaient depuis 1615, établirent chez eux la mission du Saint-Esprit en 1640 et celle de Saint-Pierre en 1648. "C'est la nation que semble la moins éloignée de la foi, de tous ces peuples errants," disait le père Jérôme Lalemant dans la *Relation* de 1642, p. 99.

"Ils semblent avoir autant de demeures que l'année a de saisons." (*Relation*, 1641, p. 81.) Vivant de pêche, de chasse et de commerce, ce devait être un ramas de gens du nord plutôt qu'appartenant à la vallée de la rivière Outaoua. Ils parlaient un idiome algonquin, c'est pourquoi le père Paul Le Jeune étant aux Trois-Rivières, l'automne de 1636, et y recontrant des Nipissiriniens, dit: "Je fus consolé de voir qu'ils entendaient mon baragouin Montagnés." (*Relation*, 1636, p. 53.) Nous retrouverons ce peuple au cours de la présente étude.

A la sortie de la rivière des Français, les Atchiligouans ou Achirigouans, de langue algonquine, avaient des rapports avec la tribu des Ataouabouskatouk du voisinage de la baie d'Hudson, et un certain nombre de ces derniers passaient les hivers sur la rive orientale de la baie Georgienne où demeuraient des petits groupes algonquins appelés, Outaoukamigouk, Sakahigmiriouek, Aouasanik (Ouasouarini), Atchougue (Outchougai). La dispersion de 1650 n'empêcha point les Achirigouans de reprendre leur poste sur la rivière des Français et de continuer leur trafic avec les Cristinos Atouabouskatouk.

Sur la côte nord de la baie Georgienne (district d'Algoma) un autre peuple de langue algonquine était surtout voyageur et guerrier. On les nommait Amikoués parcequ'ils se disaient descendants du Grand Castor qui avait construit les chutes, les digues et les rapides de la rivière des Français. Sagard note que les Hurons appelaient le castor Tsoutayé, Toutayé, et les Montagnais, Amiscou; alors le nom des Amiskoués, comme l'écrit Perrot, est algonquin et signifie les Castors. On les qualifiait, en français, de Nez-Percés. Ils furent toujours bons amis de nos coureurs de bois. De 1633 à 1634 on les voit en guerre contre les Puants de la baie Verte. Les hostilités recommercèrent en 1636. Ce peuple n'avait pas bougé du voisinage de la baie Georgienne jusqu'à 1650, où il prit l'habitude de se retirer dans l'intérieur une partie de l'année, par suite des maraudes des Iroquois.

A la côte sud-ouest du district d'Algoma il y avait, en 1640, les Nikikouch ou Gens de la Loutre, les Michisaguek ou Mississakis ou Mississagués, tribu algonquine, "fière et superbe," qui se retira au sud-est du lac Supérieur, à Kionkonan, en 1650.

La carte de Dollier et Galinée, en 1669,[1] indique la "rivière de Tessalon," comme aujourd'hui; plus à l'est le mot "Mississagué" à la sortie d'un cours d'eau; ensuite viennent les rochers et les îles où La Potherie disaient en 1700 que les Gens de la Loutre vivaient solitaires. Encore plus à l'est il y a "Amik8e" près d'une rivière. Il faut conclure que les Sauvages de cette côte nord ne s'étaient dispersés que momentanément, puisque de tout temps leur habitat fut le même.

"L'ancien pays des Hurons" (Perrot, p. 80) était, avant 1650, la baie de Penetanguishine, Natawasaga, ainsi que le lac Simcoe.

Dès 1615 les Outaouas habitaient la grande île Manitoualine. C'était une nation amie de tous ses voisins, commerçante, voyageuse, peu adonnée à la culture, ayant quelques industries particulières et pas du tout belliqueuse. Elle parlait la langue algonquine. Les Iroquois l'enveloppèrent dans la disgrâce générale, car, depuis Michillimakinac jusqu'à la rivière des Algonquins (l'Outaoua), tous les peuples furent balayés en 1650.

Et même ces étonnants ravageurs entrèrent dans la rivière Sainte-Marie, décharge du lac Supérieur, où les Français avaient pénétré en 1622 pour la première fois, et les Sauteux, gens assez braves d'ordinaire, crurent prudent d'abandonner leur pays, mais ils y retournèrent bientôt. Nous continuerons de les appeler Sauteurs—avec Nicolas Perrot—quoiqu'on les trouve sous les noms de Pouitigoueieuhak, Pahouiting8-achirini, Baouichtigouin, à l'origine, et, par la suite, Odgiboweke, Odjibewais, Ojibway, Chippeway.[2] C'étaient des Algonquins.

Nous avons fait le circuit de la baie Georgienne et parcouru la côte nord; il reste un mot à dire des aborigènes du lac Huron.

La destruction des dix-sept bourgades huronnes était complétée en 1650-51, ce qui "donna l'épouvante chez les Outaouas et leurs alliés, qui étaient au Sankinon à l'anse au Tonnerre, à Manitoaletz et Michillimakinac. Ils furent demeurer ensemble chez les Hurons, dans l'île que l'on appelle l'île Huronne." (Nicolas Perrot, p. 80.) Ceci demande explication. Au sud du lac Erié il y avait les Chats, qui n'émigrèrent nulle part mais furent anéantis sur place vers 1657. Les sauvages de "Sankinon et de l'anse du Tonnerre" (Etat du Michigan) n'étaient autres que les Mascoutins et il faut placer en 1656 leur abandon de ces lieux. Par conséquent, ils suivirent, à six ou sept années de dis-

[1] Voir le bel ouvrage de M. James H. Coyne récemment publié par la Société Historique d'Ontario.

[2] Ils appelaient le lac Supérieur *Kitchigumi*: les grandes eaux.

tance, les Outaouas de Manitoaletz (Manitoualine) qui avaient décampé en compagnie des Hurons du Petun en 1650. En outre, arrivant à l'île Huronne, à l'entrée de la baie Verte, les Mascoutins n'y trouvèrent ni les Outaouas ni les Hurons, qui étaient déjà partis pour l'ouest ainsi que nous le verrons bientôt.

La dispersion des tribus huronnes avait eu lieu comme suit: la première bande se retira dans l'île Saint-Joseph, à 7 lieues environ de Penetanguishine—en sauvage Ahoendoe, en anglais Christian ou Charity Island—puis à Manitoualine; ce devait être en 1649. La deuxième se rendit aux Iroquois, espérant être mieux traitée. Une troisième, comprenant les Gens du Petun, s'enfuit à l'île de Michillimakinac, en 1651 probablement, mais, pourchassée par les Iroquois, elle recula jusqu'à l'île Huronne, baie Verte. La quatrième demanda asile à la nation du Chat qui parlait sa langue—tous furent massacrés ensemble. La cinquième bande descendit à Québec, en 1650, avec le père Paul Ragueneau, et y demeura.

"Quand tous les Outaouas se furent répandus vers les lacs, les Saulteurs et les Mississakis s'enfuirent vers le nord, et puis à Kionconan,[1] faute de chasse." (Perrot, p. 85).

"La défaite des Hurons se répandit chez tous les peuples voisins; l'effroi s'empara de la plupart. Il n'y avait plus de sûreté à cause des incursions que les Iroquois faisaient dans le temps qu'on s'y attendait le moins. Les Nepiciriniens s'enfuirent au nord,[2] les Sauteurs et les Missisakis avancèrent dans la profondeur des terres. Les Outaouaks et ceux qui habitaient le lac Huron se retirèrent dans le sud et, s'étant tous réunis, ils habitèrent une île qui porte encore le nom de l'île Huronne. Les Hurons s'y étaient placés les premiers." (La Potherie, II, 52).

L'île la plus grande[3] qui se trouve à l'entrée de la baie Verte avait été occupée par les Poutéouatamis, lesquels demeuraient, en 1650, à quelques lieues dans l'intérieur de la baie, direction nord-ouest-ouest. Ces Poutéouatamis avaient été chassés du Michigan oriental par les Iroquois avant 1634.

Parmi les bandes de malheureux proscrits dispersées un peu partout à l'aventure, il en est une que nous suivrons de préférence dans cette étude—la tribe des Hurons du Tabac, les Petuneux, de la côte est du lac Huron, réfugiés (1651) dans l'île de Michillimakinac et, peu

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[1] Promontoire sur la côte sud du lac Supérieur, à l'est: Kewana aujourd'hui.

[2] Chez les Gens des Terres, ainsi nommés parce qu'ils étaient à égale distance de la baie d'Hudson et des lacs Nipissing, Huron et Supérieur.

[3] Elle a reçu le nom d'île Huronne bien que les Hurons n'y aient séjourné que deux ans à peine. Ce doit être *The first Landing Isle* de Radisson, sur laquelle on dispute depuis quinze ans. Nous en parlerons au printemps de 1660.

après, à la baie Verte, connue alors sous la seule désignation de baie des Puants.[1]

" Les Tionnontatehronnons que nous appellions autrefois la Nation du Petun, de langue huronne, et les Ondataououat,[2] de langue algonquine, que nous appellons les Cheveux Relevés, à cause que leur chevelure ne descend point en bas, mais qu'ils font dresser leurs cheveux, comme une crête qui porte en haut—ont quitté leur ancien pays et se sont retirés vers les nations plus éloignées, vers le grand lac que nous appellons des Puants." (*Relation,* 1654, p. 9.)

Un parti iroquois fort de huit cents hommes s'avança, (1652?) jusqu'à l'île Huronne qu'il trouva déserte, car les Hurons et les Outaouas, avertis du danger par les éclaireurs qu'ils avaient envoyés à la découverte, s'étaient "retirés au Méchingan où ils construisirent un fort, dans la résolution d'y attendre leurs ennemis, qui ne purent rien entreprendre pendant les deux premières années." (Perrot, p. 81). L'endroit de cette retraite est à la côte nord-ouest de la baie Verte, non loin de la ligne qui sépare le Michigan occidental du Wisconsin. Du temps de Perrot la division des Etats n'existait point.

Il faut ici corriger une erreur qui s'est introduite chez les historiens et que l'on trouve exprimée comme suit dans un travail du juge John Law publié par la Société Historique du Wisconsin, III, 95, année 1855 (voir aussi pages 112-13, 123-24, 508-9 du même volume) : " En 1652, le père Dequerre, jésuite, partit de la mission du lac Supérieur et alla fonder une mission florissante aux Illinois, probablement celle de Saint-Louis où est situé Peoria. Il visita plusieurs nations des bords du Mississipi et fut tué au milieu de ses travaux apostoliques en 1661." Aucun religieux du nom de Dequerre n'est connu de ceux qui ont étudié les archives du temps. De plus, en 1652, il était impossible qu'il y eut des prêtres, ni aucun Français, dans ces régions. Ce faux renseignement est tiré d'une liste du clergé commencée, il y a cent ans, par M. le grand-vicaire Noiseux et qu'il ne voulait pas publier, n'étant pas certain des faits qu'il y avait notés. On l'a cependant imprimée après sa mort. Le juge Law dit, encore d'après Noiseux, que, "en 1657, le père Jean-Charles Drocoux, jésuite, se rendit aux Illinois et retourna à Québec la même année," mais il n'y avait pas de missionnaire au Wisconsin en 1657, et personne ne connaît le père Drocoux.

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[1] Les Puants, très féroces et assez nombreux, furent presque tous tués par les Illinois vers 1653.

[2] Nicolas Perrot, qui eut des rapports continuels avec eux, de 1663 à 1700, les nomme toujours Outaouas. Ondataoua signifie, en langue huronne, les gens des bois. Les Hurons vivaient en plaine.

II

Il y avait alors quatre ou cinq ans que les Outaouas et les Hurons se trouvaient dépaysés et que leur commerce avec les Français [1] était anéanti. Cette considération les détermina à tenter un effort suprême pour se procurer des marchandises dont ils avaient grand besoin, ayant contracté l'habitude de s'en servir depuis plus d'une génération. " Leur défaite ne faisait qu'augmenter le souvenir de se voir frustrés du commerce des Français. Ils firent cependant des tentatives pour trouver encore des voies propres à continuer la première alliance. En effet, trois Outaouaks des plus hardis s'embarquèrent (1653) dans un canot et prirent le nord du lac Supérieur pour éviter de tomber entre les mains des Iroquois. Après avoir passé de rivières en rivières, de portages en portages, ils tombèrent dans celle des Trois-Rivières qu'ils descendirent jusqu'à son embouchure, où ils trouvèrent un établissement français. Ils y traitèrent de leurs pelleteries. Les grandes fatigues qu'ils eurent pendant le voyage, les empêchèrent de reprendre la même route. Il s'y (aux Trois-Rivières) trouva, par hasard, quelques Algonkins qui se préparaient à remonter chez eux; ils profitèrent de la même occasion, passant par le véritable chemin (l'Ottawa) qui mène à Outaouak, ne marchant que la nuit de crainte de tomber entre les mains de leurs ennemis, et arrivèrent enfin à l'île Huronne au bout d'un an, avec l'applaudissement général de leurs camarades qui avaient désespéré de leur retour." (La Potherie, II, 52). L'auteur a l'air de croire que les Hurons et les Outaouas étaient encore à l'île Huronne en 1653, mais il paraîtrait que dès 1652, ils l'avaient abandonnée.

Voici un passage du *Journal des Jésuites* qui complète ce renseignement: "Le 31 juillet 1653, arrive (à Québec) un canot des Trois-Rivières, qui nous apporte la nouvelle de l'arrivée de trois canots du pays des Hurons, savoir: Aennons huron, Mang8ch nipissirinien, Mat8tisson que les Hurons appellent Ondatenront, Eenta8ai et Totraenchiarak, Andarahitronnons, et deux Ondata8a8ak, *vel* 8ta8ak (Outaouas) savoir: Teochia8enté et Otontagonen; lesquels sept sauvages ont apporté nouvelles que toutes les nations algonquines s'assemblent avec ce qui reste de la nation du Petun et de la nation Neutre, à Atotonatendïé, à trois journées au-dessus du Sault Skiaté [2] tirant vers le sud. Ceux de la nation

[1] Les Hurons appelaient les Français "*Agnonha*, gens de fer ou qui se servent de fer, ou le fer même, car ils nommaient quelquefois les haches *agnonha*, qu'ils appellent autrement *atouhoin*." (Sagard: *Histoire du Canada*, 1636, p. 221.)

[2] Le saut Sainte-Marie. La carte de Sanson, 1656, porte à cet endroit le mot Skiaeronon, ce qui veut dire en langue huronne "la tribu de Skiae." Brulé qui vit le saut en 1622, le mentionna à Champlain, c'est pourquoi la carte de 1632 l'appelle "Saut de Gaston," en l'honneur du frère du roi Louis XIII.

du Petun ont hiverné à Teatontoraï, les Neutres au nombre de 800 à Skentchiote, vers Tetotchanontian, lesquelles deux nations se doivent rendre l'automne prochain à Atotonatendïé, où dès maintenant ils sont mille hommes, savoir:

400 Ondatonatendi.

200 8ta8ak ou Cheveux Relevés.

100 tant A8etatsi8aentronnons que de la nation d'Atcha8i.

200 Enskiateronnons.

100 tant A8echisaetronnons que Achir8achronnons.

C'est Acha8i qui conduit toute cette affaire."

Est-ce lui qui parla d'une grande rivière située plus loin que la baie Verte et qui se décharge dans la mer? Marie de l'Incarnation mentionne ce fait dans une lettre du 24 septembre 1654. C'est la plus ancienne notion du Mississipi, celle de Jean Nicolet exceptée.

III

"Ce succès si favorable les obligea plus que jamais, et leurs voisins, à faire des parties de chasse. Ils descendirent ensuite (1654) en flotte chez les Français, sans se mettre en peine de tous les obstacles et de tous les dangers qu'ils pourraient courir. Ils y furent reçus avec agrément. On les régala; il y goutèrent du pain avec délice, des pruneaux et autres choses qu'ils trouvèrent meilleures que leurs mets ordinaires. Après avoir commercé leurs pelleteries, ils s'en retournèrent chez eux ravis d'y trouver leurs familles fort paisibles." (La Potherie, II, 53).

"Une flotte parut dans le lointain, qui descendait les rapides et les chutes d'eau qui sont au-dessus de Montréal. On eut sujet de craindre que ce ne fut une armée ennemie, mais on reconnut aux approches que c'étaient des amis qui venaient de quatre cents lieues loin, nous apporter des nouvelles de leur nation et en savoir des nôtres. Les habitants de Montréal et des Trois-Rivières eurent une double joie, voyant que ces canots étaient chargés de pelleteries que ces nations viennent traiter pour nos denrées françaises." (*Relation*, 1654, p. 9.) Le narrateur ajoute que ces sauvages, étaient "partie de la nation du Petun, partie Ondataouaouats," comme nous l'avons fait entendre plus haut. Ils étaient cent vingt hommes. En chemin ils avaient fait "rencontre de quelques Iroquois Sonnontochronnons et de quelques gens de la nation du Loup,[1] alliés des Iroquois Anniehronnens, qui étaient à la chasse. Ils en firent treize de captifs, qu'ils ne voulurent point traiter dans les cruautés ordinaires, non pas même leur lier les bras ni les mains. Dieu

[1] Mahingans, Mohicans.

adoucit les cœurs barbares quand c'est lui qui veut faire la paix. Cette troupe victorieuse, arrivée heureusement à Montréal, y ayant vu la disposition des esprits et que tout tendait à la paix, fit présent de ses captifs à Sagochiendagethé, capitaine onnontaehronnon qui, de son gré, y était demeuré pour ôtage, attendant le retour du Français[1] amené captif. Ce ne sont que festins et que chants de joie, dans une douce impatience qu'on voit au plutôt ce retour. Là-dessus le Français arriva comme il a été dit au chapitre précédent. Les Iroquois onnontaehronnons qui le ramenaient nous firent voir que Dieu travaillait plus que nous à l'affermissement de cette paix. Ils nous apprennent qu'une nouvelle guerre leur était survenue qui les jette tous dans la crainte; que les Ehriehronnons (nous les appellons la nation du Chat) arment contre eux. . . . . que cette nation a poursuivi une de leurs armées . . . . . qu'un de leurs plus grands capitaines a été pris . . . . que tout est en feu dans les quatre nations des Iroquois supérieurs . . . . . Quelques Hurons qui se sont répandus partout lors que leur pays fut ruiné, se sont joints aux Chats et ont suscité cette guerre qui donne de la terreur aux Iroquois."

La présence des Outaouas et des Hurons sur le Saint-Laurent ouvrait une ère nouvelle à l'ambition des marchands de fourrures et au zèle des missionnaires. On invitait les Français, de la part de nations presque inconnues, à parcourir l'ouest, le nord et le sud, leur promettant un trafic avantageux. Les pères jésuites entrevoient là une abondante moisson à recueillir pour le bien des âmes.

La compagnie des Cent-Associés qui avait la prétention d'être toute chose dans le Bas-Canada, mais qui, en réalité, n'était rien parce que ses affaires avaient toujours été mal conduites, s'effaçait presque entièrement en 1644 pour laisser le champ libre à une nouvelle organisation aussi mal administrée que la première; de sorte que, en 1652, la banqueroute était aux portes. Alors une société de la Rochelle prit en main le commerce du castor, sans faire beaucoup mieux. Et la guerre des Iroquois ne s'arrêtait pas! La colonie française, composée de sept à huit cents personnes, se voyait sur le point de retourner en France pour éviter un désastre général. Cette époque est désignée dans notre histoire comme "les temps héroïques." Nous étions une centaine de familles distribuées à Québec, Trois-Rivières, Montréal, et livrées sans protection à la rage des Iroquois, néanmoins, il y avait dans ces groupes des hommes assez intrépides pour aller à quatre et cinq cents lieues découvrir des nations barbares et rapporter de leurs courses les précieuses dépouilles des hôtes des bois qui luttaient sur les marchés de l'Europe contre les produits des chasses moscovites.

[1] Entre autres un jeune chirurgien enlevé le printemps de cette année par une troupe d'Onneyouts, près de Montréal.

M. Jean de Lauzon, gouverneur général, envoya deux hommes avec les marchandises nécessaires pour la traite des pelleteries. Ils partirent avec les sauvages ci-dessus le 6 août 1654. Ce voyage marque dans l'histoire des découvertes de l'ouest. Nous ne connaissons pas les noms de ces coureurs de bois, mais il era parlé d'eux plus loin.

L'opinion généralement reçue est que c'étaient Médard Chouart et Pierre-Esprit Radisson. Comme ils reviendront dans ces pages, il faut voir quelle était leur situation en 1654, après quoi le lecteur portera son jugement. Disons de suite que Chouart et Radisson nous paraissent étrangers aux deux hommes dont il s'agit, toutefois c'est le moment de parler d'eux.

Chouart était arrivé à Québec en 1642 ou 1643, âgé de dix-sept à dix-huit ans. Il entra au service des jésuites qui l'employèrent dans les missions huronnes. Sur la fin de l'été de 1646 nous le voyons revenir en compagnie de Gilles Bacon, autre engagé des jésuites, lequel était porteur d'échantillons de minerai et de pierres dont M. de Montmagny, gouverneur général, et d'autres personnes s'occupèrent, mais que les circonstances de temps ne permirent pas d'étudier à fond. On peut supposer que Chouart n'était pas étranger à ces découvertes de métaux. Quoi qu'il en soit, dans ses courses vers l'ouest, il avait dû apprendre quelque chose des Cristineaux ou Kilistinons qui habitaient entre le lac Supérieur et la baie d'Hudson. Dès le même automne de 1646, il repartait pour les grands lacs. A son retour, l'année suivante, il épousait, à Québec, Hélène Martin, fille du propriétaire des fameuses plaines d'Abraham. En 1649, il passa en France et en revint l'année d'après, si l'on en juge par la naissance de son fils Médard, en 1651, à Québec. Le *Journal des Jésuites*, du 16 juillet 1653, le mentionne retournant d'un voyage en Acadie et l'appelle Groseilliers—première trace de ce surnom.

Radisson, âgé d'une vingtaine d'années, arriva de France au commencement de l'été de 1651 et se rendit aux Trois-Rivières, chez sa sœur Marguerite, femme de Jean Veron de Grandmesnil. Il devait avoir deux autres sœurs dans ce lieu: Françoise et Elisabeth, non encore mariées. Rien n'indique qu'il connût Chouart, dont l'épouse mourait à Québec cette même année. Notre jeune homme passa un an à se familiariser avec la vie du canotier et du coureur de bois, apprenant l'algonquin et le huron, deux langues mères répandues, à l'exclusion de toute autre, depuis Québec jusqu'à l'Ohio et au Wisconsin. Ses progrès furent rapides sans doute, car il était doué de talents d'assimilation remarquables, avait de la lecture, la faculté d'observation et une excellente mémoire. Avec cela, méthodique et ayant beaucoup voyagé pour son âge. Robuste de corps, d'un esprit enjoué, brave, un peu gascon, circonspect, il offre un caractère à étudier, et sa longue

carrière, ses aventures, ses écrits invitent à lui donner une place spéciale dans l'histoire qui nous occupe.

Les Iroquois rôdaient toute l'année autour des Trois--Rivières à cette époque. Un jour du mois de juin ou juillet 1652, Radisson, avec deux chasseurs, parcourait la banlieue et se trouvait seul un moment lorsqu'il se vit entouré d'une trentaine d'ennemis qui l'enlevèrent. Trois ou quatre semaines plus tard, au même endroit, fut tué le gouverneur des Trois-Rivières avec une vingtaine d'hommes (19 août 1652). Le captif est entraîné sur la rivière Richelieu et subit le supplice des verges dans un village des environs d'Oswego, où ses ravisseurs le donnent à une famille iroquoise. Il déserte, se sauve jusqu'au lac Saint-Pierre, est de nouveau capturé, ramené au même village, tourmenté par le feu, puis gracié et retrouve sa place ou milieu de ses "frères et sœurs." Ayant pris son parti de devenir sauvage, il accompagne une armée qui va en expédition vers Buffalo. Au printemps de 1653 il est chez les Tsonnontouans. Ensuite il va à Orange (Albany) avec ceux qui portent des fourrures aux Hollandais (automne) et y rencontre le père Joseph Poncet racheté des Iroquois par le chef du poste. A peine retourné dans son village, la nostalgie le prend, il s'évade et revoit le fort Orange (29 novembre) d'où on l'embarque pour la Hollande. Le 4 janvier 1654 il est à Amsterdam et, vers le printemps, arrive à la Rochelle comptant sur un navire en destination de la Nouvelle-France.

Dans la narration de ses voyages,[1] il dit (p. 86) qu'il attendait à la Rochelle l'occasion de repartir pour le Canada et, sur ces mots, il termine son récit. La ligne suivante porte le titre de *Second Voyage.* Celui-ci débute en disant qu'un bateau de pêche le prit, le 15 mai, en route pour Percé, et qu'il y arriva le 7 du même mois, ce qui n'est pas possible. Il doit y avoir un feuillet omis. Il ajoute aussistôt que, cinq jours après, il était à Québec. En quelle année ceci eut-il lieu et d'où venait-il? De l'Acadie probablement, car les vaisseaux de France n'arrivaient pas à Québec avant le 15 juin et même plus tard. Ce qui nous fait croire, en outre, que les vingt premières lignes du second voyage ne sont pas la suite du précédent, c'est qu'elles se terminent par ces paroles: "The year before the French began a new plantation in the upper country of the Iroquoits," et, comme ce nouvel établissement des Français, chez les Onnontagués, avait eu lieu l'été de 1656, il va de soi que Radisson reparut à Québec et aux Trois-

[1] Publiée en 1885, pour la première fois par la *Prince Society*, de Boston. L'écrit est en anglais, évidemment rédigé par Radisson, car il fourmille de phrases qui ont la forme française et de termes de coureurs de bois. Ajoutons qu'il a été mal lu par le copiste et par l'éditeur.

Rivières en 1657. Reste à savoir ce qu'il a fait du printemps de 1654 au mois de juin 1657; il ne le dit nulle part.

En tous cas, lors de son retour aux Trois-Rivières, il a dû apprendre que son beau-frère, Jean Veron de Grandmesnil, avait été tué le 19 août 1652, et que la veuve s'était remariée le 24 août 1653 avec Médard Chouart des Groseilliers; de plus, que Françoise, son autre sœur, avait épousé Claude Volant l'hiver de 1653-54. La troisième sœur, Elizabeth, se maria avec Claude Jutra le 20 novembre 1657, probablement en sa présence.

Puisque nous ne savons pas ce qu'était devenu Radisson du printemps de 1654 au mois de juin 1657, voyons si Chouart nous échappe également durant cette période. Le 24 février 1654, il est cité comme sergent-major de la garnison des Trois-Rivières. Le 19 mars suivant, aux Trois-Rivières, " madame Desgroseilliers " présente en cour une réclamation contre Mathieu Labat, sans doute en l'absence de son mari. Au même lieu, en 1655 " Marguerite Hayet,"[1] paraît en cour "vu l'absence de son mari." Le 9 septembre 1656, Chouart est parrain d'une petite sauvagesse aux Trois-Rivières.

Donc, si l'on soutient que les deux hommes envoyés par M. de Lauzon dans l'ouest, le 6 août 1654, et qui revinrent à la fin d'août 1656, étaient Chouart et Radisson, nous ne pouvons pas produire un *alibi,* mais nous demandons sur quoi l'on se base pour affirmer un tel fait. Ce ne peut être qu'une supposition et, sur ce terrain, comment expliquer que M. de Lauzon ait fait choix de deux " voyageurs " aussi peu serviles que ceux-là? Ils n'étaient pas du parti du gouverneur, si nous entendons bien les choses de ce temps. Encore, pourquoi Radisson, dans ses écrits, n'en parle-t-il pas? Tout ce que nous connaissons de lui donne à croire fermement que jamais, avant 1658, il n'a vu l'ouest—et pourtant il note que Chouart y était allé autrefois—du temps des jésuites chez les Hurons. Il ne cache point que d'autres Français avaient parcouru ces contrées. Pas un mot de lui-même à cet égard; il se présente là, comme chez les Iroquois en 1652, faisant son premier voyage et voyant partout du nouveau. Nous ne croyons pas au prétendu ou supposé voyage de Chouart et Radisson dans l'ouest, du mois d'août 1654 au mois d'août 1656.

IV

Suivons maintenant les sauvages partis du Saint-Laurent avec les deux hommes de M. de Lauzon, le 6 août 1654, et qui tous arrivèrent à la baie Verte chez les Poutéouatamis.

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[1] C'est le nom de la famille Radisson.

"Quelque temps après (ce retour) un de leurs canots donna avis d'une armée d'Iroquois qui était fort proche. L'alarme se répandit bien vite dans tous les lieux circonvoisins. Toutes ces nations se réfugièrent[1] chez les Poutéouatamis, qui étaient à un journée plus loin. Ils n'eurent pas de peine à faire un grand fort où elles se trouvèrent à l'abri des Iroquois, en cas qu'ils voulussent y faire quelqu'enterprise. Ceux-ci, qui avaient trouvé l'île Huronne abandonnée, poussèrent jusqu'aux Poutéouatamis, non pas comme des conquérants mais comme des suppliants qui imploraient leurs secours. En effet, la famine devint universelle parmi les Iroquois. Il se fit cependant un traité de paix[2] de part et d'autre. Les Iroquois se flattaient qu'ils en viendraient tôt ou tard à bout, comme ils avaient fait des Hurons après une paix semblable à celle qu'ils avaient faite avec eux trois ans auparavant. Les Poutéouatamis les reconnurent dans cette conjecture pour les maîtres de toutes les nations, ils ne cessaient point de les applaudir et de les louer de ce qu'ils avaient soumis les Hurons qui étaient les plus fiers et les plus redoutables. Ils ne voulaient pourtant pas sortir de leur fort, se contentant de leur envoyer des vivres dans leur camp. Peu s'en fallut que tous les Iroquois ne périssent dans un grand festin qu'ils leur avaient préparé, dont les viandes étaient empoisonnées. Une Huronne qui avait son fils prisonnier parmi les Iroquois leur en donna avis. Ce projet avorta, ceux-ci se retirèrent sans avoir pu réussir. Les uns retournèrent sur leurs pas et les autres suivirent le bord du lac Huron pour y trouver de quoi subsister plus aisément." (La Potherie, II, 53-55.)

Le récit de Perrot contient les mêmes faits avec quelques détails en plus. "Ils (les Iroquois) firent encore quelques efforts pour réussir et mirent en campagne une espèce de petite armée, afin de détruire les villages de ce nouvel établissement,[3] qui avaient déjà beaucoup travailler à défricher les terres. Ils eurent cependant assez de temps pour recueillir leur grain avant l'arrivée de l'ennemi, car ils avaient toujours soin de tenir du monde à la découverte pour n'être pas surpris, qui les découvrirent véritablement. Les Irroquois arrivèrent donc enfin un matin devant le fort qui leur parut imprenable. Dans cette armée il y avait plusieurs Hurons issus de ceux qu'on voulait attaquer et dont les mères avaient évité la défaite qui arriva lorsque les Iroquois furent

[1] D'après Perrot, p. 81, le déplacement des réfugiés de l'île Huronne pour se rendre chez les Poutéouatamis aurait eu lieu en 1652, et il ajoute que les Iroquois furent deux années sans reparaître.

[2] De 1637 à 1697 il s'est écoulé soixante ans durant lesquels les Iroquois ont négocié ou consenti soixante traités de paix aussitôt rompus que proclamés.

[3] Non plus l'île Huronne, mais le fort des Poutéouatamis au nord-ouest de la baie Verte.

dans leur ancien pays. L'ennemi manquait déjà de vivres, parce que dans la route qu'ils avaient tenue jusqu'alors, il ne s'était rencontré que très peu de bêtes. On parlementa et l'on proposa de traiter d'une paix ensemble: savoir que les Hurons qu'ils avaient dans leur armée seraient rendus; ce qui fut écouté et accordé. Pour conclure les propositions, on convint que six chefs entreraient dans le fort des Hurons, et qu'en échange ils en livreraient six de leur côté en ôtage. C'est ainsi que la paix fut faite et arrêtée entre eux. Les Outaouas et les Hurons firent présent aux Iroquois de quelques viandes, et en traitèrent aussi avec eux pour des colliers de porcelaine et des couvertes. Ils demeurèrent campés plusieurs jours pour se refraîchir, sans néanmoins entrer dans le fort beaucoup la fois, mais quelques-uns seulement, que les Outaouas tiraient par-dessus les palissades avec des cordes.

"Les Outaouas firent savoir à l'armée des Irroquois, avant leur départ, qu'ils étaient dans le sentiment de leur faire présent à chacun d'un pain de blé d'Inde. Ils composèrent un poison pour y mettre. Quand ces pains furent cuits, ils les leur envoyèrent; mais une femme huronne qui avait son mari parmi les Iroquois, savait le secret et en avertit son fils; elle lui dit de n'en point manger parce qu'ils étaient empoisonnés. Son fils en donna sitôt avis aux Irroquois, qui en jettèrent à leurs chiens, dont ils moururent. Il n'en fallut pas davantage pour les assurer de la vérité de cette conspiration, et se résoudre à partir sans vivres. Ils résolurent de se partager en deux partis, dont l'un relâcha delà (mots illisibles)[1] qui fut défait par les Saulteurs, Mississakis et les gens de la Loutre[2] (qui veut dire en leur langue Nikikouet) dont il y en eut peu qui échappèrent. Le gros parti poussa plus loin[3] et se trouva en peu de temps parmi les buffles. Si les Outaouas avaient été aussi braves que les Hurons, et qu'ils les eussent poursuivis, égard à la disette où ils étaient, ils les auraient sans doute défaits; mais quand ils eurent (les Iroquois) abondamment de vivres, ils avancèrent toujours, jusqu'à ce qu'ils tombèrent sur une petite brigade d'Illinoëts dont ils défirent les femmes et les enfants; car les hommes s'enfuirent vers leurs gens qui n'étaient pas bien éloignés delà. Ils s'assemblèrent d'abord, et couru-

[1] Probablement "delà la baie des Puants, au lac Huron," où ils furent battus.

[2] Les Sauteux, du saut Sainte-Marie, les Mississagués et les Gens de la Loutre on Nikikouets, de la côte d'Algoma, nous sont connus. Il ne paraît pas que les Amikoués ou Castors aient formé partie de l'expédition. La victoire mentionnée dans la *Relation* de 1671, p. 32, colonne 2, n'a pas eu pour théâtre le lac Huron, mais le territoire des Amikoués, au nord-ouest de la baie Georgienne.

[3] Au sud, chez les Illinois, par le lac Michigan.

rent après les Irroquois qui ne s'en méfiaient pas; après les avoir joints la nuit, ils donnèrent dessus et en tuèrent plusieurs. D'autres villages Illinoëts qui chassaient aux environs, de distance en distance, ayant eu avis de ce qui se venait de passer, accoururent et trouvèrent leurs gens qui venaient de faire coup sur les Irroquois. Ils se joignirent ensemble, s'encouragèrent, et s'étant hâtés, attrapèrent l'ennemi, lui donnèrent combat et le défirent entièrement; car il y en eut très peu qui se rendirent à leurs villages. C'est la première connaissance que l'Illinoëts a eue de l'Irroquois et qui leur a été fatale (aux Iroquois) mais dont ils se sont bien vengés." (Perrot, 82-83).

Reprenons le texte de La Potherie, II, 55: "Les Iroquois se retirèrent sans avoir pu réussir. Les uns retournèrent sur leurs pas et les autres suivirent le bord du lac Huron [1] pour y trouver de quoi subsister plus aisément. Ces derniers se trouvèrent dans de vastes campagnes, où ils tuèrent quantité d'ours, de bœufs, biches, cerfs, chevreuils et toute sorte de gibier. Plus ils avançaient, plus ils rencontraient de ces animaux. Un Iroquois qui était écarté de ses camarades découvrit des pistes d'hommes et aperçut presque en même temps de la fumée. Il en donna aussitôt avis aux autres qui reconnurent un petit village [2] d'Islinois. Ils donnèrent dessus sans trouver de résistance, n'y ayant que des femmes et des vieillards, le reste du village étant dispersé à la chasse. Un chasseur qui arriva le premier fut bien surpris de ne voir à sa rencontre que des cadavres. Il en porta la nouvelle à plusieurs autres villages voisins; l'on joignit en peu de jours les Iroquois. Les Islinois leur livrèrent combat, les défirent et ramenèrent tous les prisonniers. Les Iroquois n'avaient jamais été dans ces quartiers, mais toutes ces vastes campagnes ont été depuis le théâtre de la guerre."

Des soixante bourgades, des vingt mille guerriers et des cent vingt mille âmes des Illinois il ne restait plus que deux ou trois bourgades en 1658—les autres avaient émigré de l'autre côté du Mississipi, dans l'Iowa, poursuivis jusqu'au grand fleuve par les Iroquois. On voit que Perrot et La Potherie disent juste en faisant allusion aux malheurs qui résultèrent pour les Illinois de l'épisode de 1654.

V

Notre objet principal étant de suivre le groupe d'Outaouas et de Hurons du Petun qui se tenait dans la baie Verte, il faut voir leurs mouvements au cours des années 1654-57. Voici comment s'exprime

[1] Il faut lire: lac des Illinois appelé Michigan.

[2] Le copiste de Perrot a lu "brigade." Ce doit être "bourgade" puisque La Potherie met "village." (Remarque du R. P. Tailhan.)

Nicolas Perrot, p. 85: "Les Outaouas, craignant de n'être pas assez forts pour soutenir les incursions des Irroquois, qui étaient informés de l'endroit où ils avaient fait leur établissement, se réfugièrent au Mississipi, qui se nomme à présent la Louisiane." Mettons que ceci eut lieu l'automne de 1654[1] ou en 1655, car on verra plus loin que la chose ne tarda guère. Le passage suivant entre dans certains détails additionnels:

"Ces peuples (Outaouas et Hurons) qui avaient été assez heureux d'éviter leur perte, jugèrent bien qu'il n'y avait pas grande sûreté de demeurer dorénavant dans un pays qui pourrait devenir la proie des Iroquois, quelque paix qu'ils eussent faite avec eux. Ils se réfugièrent dans l'ouest,[2] chez des nations qui les reçurent favorablement. Ils s'y seraient établis s'ils ne s'étaient pas vus trop éloignés des Français, et s'il y avait eu des arbres pour faire des canots qui leur étaient absolument nécessaires. Ils quittèrent ce pays et s'établirent sur le Mississipi qui les charma par la quantité d'ours, de biches, cerfs, chevreuils, castors, surtout de ces bœufs qui ont le poil aussi fin que de la soie, dont on a fait des chapeaux il y a peu d'années en France, et de toutes sortes de gibiers dont les rivières et les campagnes, les forêts étaient remplies." (La Potherie II, 55-6.)

"Les Hurons de la nation du Petun appelés Tionnotanté, ayant autrefois été chassés de leur pays par les Iroquois, se réfugièrent en cette île si célèbre pour la pêche, nommée Missilimakinac; mais ils n'y purent rester que peu d'années, ces mêmes ennemis les ayant obligés de quitter ce poste si avantageux. Ils se retirèrent donc plus loin, dans les îles qui portent encore leur nom et qui sont à l'entrée de la baie des Puants; mais ne s'y trouvant pas encore assez en assurance, ils se retirèrent bien avant dans les bois[3] et, de là, enfin choisirent pour dernière demeure l'extrémité du lac Supérieur,[4] dans un endroit qu'on a appelé la pointe du Saint-Esprit." (*Relation*, 1672, p. 36.)

Amenaient-ils avec eux les Français de M. de Lauzon, ou si ces deux hommes restèrent à la baie Verte? Cette dernière hypothèse nous semble la plus acceptable[5] par le désir qu'ils devaient avoir de

[1] Les écrivains du Wisconsin et du Minnesota disputent sur ces mouvements de la bande huronne-outaouaise, faute de connaître les faits dans leur ensemble.

[2] Au sud du lac Supérieur.

[3] Wisconsin et Mississipi, 1655-56.

[4] En 1657.

[5] La *Relation* de 1658, p. 21, dit que, à trois journées par eau du bourg Saint-Michel (Poutéouatamis) tirant dans les terres, est la nation des Maskoutensak et des Outitchakouk. Les deux Français qui ont voyagé en ces contrées-là disent que ces peuples sont de très douce humeur."

retourner chez eux en 1655. Quant à nos Sauvages, Perrot ajoute: "Ils montèrent ce fleuve[1] à douze lieues ou environ d'Ouisconchin (la rivière Wisconsin) où ils trouvèrent une autre rivière qui se nomme des Ayoës (Iowa à présent). Ils la suivirent jusqu'à sa source et rencontrèrent des nations qui les reçurent cordialement. Mais, dans toute l'étendue du pays qu'ils parcouraient n'ayant pas vu de lieu propre à s'établir, à cause qu'il n'y avait du tout point de bois, et qu'il ne paraissait que prairies et rases campagnes, quoique les buffles et autres bêtes y fussent en abondance, ils reprirent la même route pour retourner sur leurs pas et, après avoir encore une fois abordé la Louisiane,[2] ils montèrent plus haut. Il n'y furent pas longtemps sans s'écarter pour aller d'un côté et d'autre à la chasse: je parle d'une partie seulement de leurs gens que les Scioux rencontrèrent, prirent et amenèrent à leurs villages. Les Scioux, qui n'avaient aucune connaissance des armes à feu et autres instruments qu'ils leur voyaient, ne se servant que de couteaux de pierre de moulange et de haches de cailloux, espérèrent que ces nations nouvelles, qui s'étaient approchées d'eux, leur feraient part des commodités qu'ils avaient. Croyant qu'ils étaient des esprits parce qu'ils avaient l'usage de ce fer qui n'avait pas de rapport avec tout ce qu'ils avaient, ils les menèrent à leurs villages, et puis les rendirent à leurs gens.

"Les Outaouas et les Hurons les reçurent fort bien à leur tour, sans néanmoins leur faire de grands présents. Les Scioux étant revenus chez eux, avec quelques petites choses qu'ils avaient reçues des Outaouas, en firent part aux autres villages leurs alliés, et donnèrent aux uns des haches et aux autres quelques couteaux ou alènes. Tous ces villages envoyèrent des députés chez les Outaouas, où, sitôt qu'ils furent arrivés, ils commencèrent, suivant la coutume, à pleurer sur tout ce qu'ils rencontraient, pour leur marquer la joie sensible qu'ils avaient de les avoir trouvés, et les exhorter d'avoir pitié d'eux, en leur faisant part de ce fer qu'ils regardaient comme une divinité.

"Les Outaouas, en voyant ces gens pleurer[3] sur tous ceux qui se présentaient devant eux en conçurent du mépris et les regardèrent comme des gens bien au-dessous d'eux, incapables même de faire la guerre. Ils leur donnèrent aussi une bagatelle, soit couteaux ou alènes, que les Scioux témoignèrent estimer beaucoup, levant les yeux

[1] Le Mississipi. La Mère de l'Incarnation écrivait dès 1654: "Des sauvages fort éloignés disent qu'il y a au-dessus de leur pays une rivière fort précieuse qui aboutit à une grande mer que l'on tient être celle de la Chine."

[2] La sortie du Wisconsin.

[3] Cette manière de témoigner son admiration existait en Europe, au dire de madame de Créquy. Vers 1750, deux Lithuaniens de nobles familles répandirent d'abondantes larmes, en présence de la société parisienne, en visitant les musées et les maisons princières.

au ciel et le bénissant d'avoir conduit ces nations dans leur pays, qui étaient en état de leur procurer de si puissants moyens pour faire cesser leur misère. Les Outaouas, qui avaient quelques fusils, les tirèrent et le bruit qu'ils firent les épouvanta tellement qu'ils s'imaginèrent que c'était la foudre ou le tonnerre dont ils étaient maîtres pour exterminer ceux qu'ils voulaient. Les Scioux faisaient mille caresses aux Hurons et Outaouas partout où ils étaient, leur marquant toutes les soumissions possibles afin de les toucher de compassion et d'en tirer quelque utilité, mais les Outaouas en avaient d'autant moins d'estime qu'ils insistaient à se tenir devant eux dans ces postures humiliantes.

"Les Outaouas se déterminèrent enfin à choisir l'île Pelée [1] pour s'établir; où ils furent quelques années [2] en repos. Ils y reçurent souvent le visite des Scioux. Mais un jour il arriva que les Hurons, étant à la chasse, rencontrèrent des Scioux qu'ils tuèrent; les Scioux, en peine de leurs gens, ne savaient ce qu'ils étaient devenus; ils en trouvèrent, quelques jours après, les cadavres auxquels on avait coupé la tête. Ils retournèrent au village en diligence porter cette triste nouvelle et rencontrèrent quelques Hurons en chemin qu'ils firent prisonniers. Quand ils furent arrivés chez eux, les chefs les relâchèrent et les renvoyèrent à leurs gens. Les Hurons, ayant assez d'audace pour s'imaginer que les Scioux étaient incapables de leur résister sans armes de fer et à feu, conspirèrent avec les Outaouas de les entreprendre et de leur faire la guerre, afin de les chasser de leur pays et de se pouvoir étendre davantage pour chercher leur subsistance. Les Outaouas et les Hurons se joignirent ensemble et marchèrent contre les Scioux. Ils crurent que, sitôt qu'ils paraîtraient, ils fuiraient, mais ils furent bien trompés, car ils soutinrent leurs efforts et même les repoussèrent et, s'ils ne s'étaient retirés, ils auraient été entièrement défaits par le grand nombre de monde qui venaient des autres villages de leurs alliés à leur secours. On les poursuivit jusqu'à leur établissement, où ils furent contraints de faire un méchant fort, qui ne laissa pas d'être capable de faire retirer les Scioux, puisqu'ils n'osèrent entreprendre de l'attaquer. Les incursions continuelles que les Scioux faisaient sur eux les contraignirent de fuir. Ils avaient eu connaissance d'une rivière qu'on nomme le rivière Noire; ils entrèrent dedans et,

[1] Offrant une belle plaine sans arbres, à trois lieues au-dessous de l'embouchure de la rivière Sainte-Croix dans le Mississipi, à l'entrée du lac Bonsecours ou Pepin, appelé lac des Pleurs par Hennepin en 1680, parce que les Sioux pleuraient de ravissement à la vue des articles de fabrique européenne qu'il leur montrait.

[2] Tout au plus de l'automne de 1655 à l'automne de 1657 ou même au printemps de 1658.

étant arrivés là où elle prend sa source, les Hurons y trouvèrent un lieu propre pour s'y fortifier et y établir leur village. Les Outaouas poussèrent plus loin et marchèrent jusqu'au lac Supérieur et fixèrent leur demeure à Chagouamikon." [1]

Récapitulons ce qui concerne les Outaouas et les Hurons du Petun: 1651, ils laissent leurs pays pour se rapprocher du Michigan nord; 1652, vont à l'île Huronne; 1653, reculent jusque chez les Poutéouatamis au nord-ouest de la baie Verte; envoyent trois canots vers le Canada pour renouer des relations commerciales; 1654, vont traiter en Canada; retournent avec deux Français; leur fort de la baie Verte est menacé par les Iroquois; 1655, se dirigent aux sources de la rivière Wisconsin; descendent au Mississipi; passent deux ans à l'île Pelée; 1657, les Hurons se rendent aux sources de la rivière Noire pour y demeurer; les Outaouas s'avancent jusqu'au lac Supérieur et s'y fixent.[2]

VI

Que se passait-il, durant ce peu d'années, à l'égard des Iroquois? Ils étendaient leur puissance. La force et la valeur que ce peuple déployait à la pratique de la guerre provenait de son organisation, de sa discipline, de son esprit de suite, infiniment supérieur à tous ce qui se voyait chez les autres nations sauvages. Il tendait à dominer de vastes territoires afin de tenir dans sa main le commerce des fourrures dont le débouché se trouvait, pour lui, dans les comptoirs hollandais, anglais et suédois des bords de l'Atlantique, par opposition aux Français du Saint-Laurent, aussi employait-il toute sa vigueur à se rendre maître du pays et du monopole qui devait résulter de ses conquêtes.

Ayant tourné leurs vues du côté des grands lacs, les Cinq-Nations commencèrent en 1654 à demander la paix avec la colonie française, prenant pour prétexte que les Eriés (les Chats) du sud du lac Erié leur faisaient la guerre à l'instigation d'une tribu huronne réfugiée chez eux. Les Eriés périrent tous dans cette lutte ou furent incorporés à l'élément iroquois. Tout aussitôt, en 1656, les Français conclurent la paix et une colonie des nôtres alla s'établir chez les Onnontagués, comme marque de confiance dans le bon esprit des Cinq-Nations. Alors, les Miamis, situés près du lac Michigan, reçurent la visite des

[1] La Potherie II, 56, se borne à dire: "Les Nadouayssioux en avaient ombrage et en tuèrent plusieurs. Ils furent encore contraints de quitter quelques années après ce pays si délicieux et vinrent demeurer à Chagouamikon, sur le lac Supérieur, où ils demeurèrent jusqu'à la paix des Iroquois (1670) avec les Français et toutes les nations, après laquelle ils se rapprochèrent de leur pays natal."

[2] Il va de soi que d'autres petites bandes de Hurons et d'Outaouas circulaient dans ces territoires indépendamment de ceux qui nous occupent ici.

destructeurs iroquois; ces pauvres gens se retirèrent (1657) dans la vallée de l'Illinois. C'était au tour des Illinois à disparaître, aussi, dès 1656, on les voit s'éloigner des rives occidentales du lac Michigan pour prendre la route de l'ouest et s'établir de l'autre côté du Mississipi, dans l'Iowa, qui avait été leur ancienne patrie et où ils vécurent quinze ou seize ans. Les Kikapous du voisinage du Détroit s'étaient réfugiés, en 1653, à l'île Manitoualine; de nouvelles incursions les repoussèrent plus loin et ils prirent refuge au Wisconsin.

Les Gens du Feu, en langage huron-iroquois Atsistaguerhonon, étaient appelés Maskouteuch par les Algonquins, ce qui veut dire " habitants de la plaine." Atsista signifie le feu et ronon les hommes, tels que irini en algonquin et vir en latin. Ces Mascoutins sont mentionnés en 1615 comme faisant la guerre aux Sauvages du nord du lac Huron, principalement les Outaouas de l'île Manitoualine, mais ces derniers s'entendaient avec les Neutres (côte nord du lac Erié) qui harcelaient continuellement les Mascoutins; cet état de choses se maintenait en 1646 et ne finit qu'en 1650, lorsque les Iroquois furent maîtres du Haut-Canada. Sur la carte de Champlain (1632) la nation du Feu est placée à l'ouest de la ville actuelle du Détroit, en un lieu nommé " Bistagueronon." Ce peuple avait sa droite vers l'extremité du lac Erié, tandis que sa gauche touchait à la baie de Saginaw. Nous sommes porté à croire que l'on peut considérer les Mascoutins comme le principal peuple de cette région jusqu'au passage de Makinac. "Cette nation du Feu est plus peuplée, elle seule, que tous ensemble ceux de la nation Neutre, tous les Hurons et les Iroquois ennemis des Hurons. Elle contient grand nombre de villages qui parlent la langue algonquine, qui règne encore plus avant." (*Relation,* 1644, p. 97-8). Le père Pierre Pijart, en mission dans la contrée des Hurons du Petun (vers Goderich) durant l'hiver de 1640-41, s'était assuré que les Mascoutins parlaient l'algonquin. Deux de ces Sauvages, pris à la guerre en 1646, dirent que leur nation n'avait jamais vu d'Européen. Les événements empêchèrent qu'on ne visitât jamais ces gens dans le Michigan. L'une de leurs tribus, les Ouchaouanag, est mentionnée en 1648, mais elle n'avait aucun rapport avec les missionnaires. Lorsque les Iroquois demandèrent la paix aux Français, en 1656, c'était afin de se trouver libres du côté du Bas-Canada; aussitôt ils portèrent leurs armes au sud et c'est alors que les Mascoutins abandonnèrent leur patrie pour se réfugier vers l'Indiana et le Wisconsin. Sur sa carte de 1660, le père Ducreux les place encore derrière le Détroit, parce que ses renseignements à ce sujet dataient de cinq ou six années déjà. Le *Relation* de 1658, p. 21, dont la substance est de 1657 au moins, les montre un peu à l'ouest de Milwaukee, où Radisson et Chouart les visitèrent en 1659.

Ce balayage accompli, les Iroquois levèrent le masque et, en 1658, rompirent la paix avec les Français.

VII

A partir de 1650, les Hurons, Outaouas, Sauteurs, Mississagués, Amikoués, Atchiligouans, Nikikouëts et Nipissiriniens, fuyant la hache de l'Iroquois, portèrent dans la baie Verte, le Wisconsin, le Minnesota, la connaissance des armes à feu et de plusieurs ustensiles que, par le moyen de leurs pelleteries, ils avaient obtenus du Canada. Il s'établit des rapports entre ces peuples divers, même ceux du nord, et le saut Sainte-Marie avec la baie de Chagouamikon devinrent les centres du commerce. Les Sioux ne tardèrent pas à connaître l'existence des Français, en commençant par admirer les articles de traite dont leurs nouveaux amis se servaient avec un orgueil et une ostentation qui les faisaient passer pour des êtres supérieurs aux autres Sauvages. Enfin, les Hurons et les Outaouas, arrivant à l'île Pelée, avaient découvert le Mississipi et n'en faisaient pas mystère. Dès 1656, à leur retour de la baie Verte, les deux traiteurs de M. de Lauzon devaient être en état de parler des " grandes eaux" dont Jean Nicolet avait fait mention vingt ans auparavant.

L'action hardie des Outaouas et des Hurons rouvrant la traite (1654) avec la colonie française ne fut pas répétée l'année suivante, mais, en 1656, les sauvages de la Baie renouvelèrent cet exploit, malgré les embuscades dans lesquelles ils auraient pu tomber.

Puisque les Hurons du Petun et leurs amis les Outaouas rôdaient alors au Mississipi, quels étaient donc ces Sauvages de la Baie qui allèrent en traite sur le Saint-Laurent avec les deux hommes de Lauzon ? Un mélange de nations—Sakis, Poutéouatamis, Malomines, Mantouck, tous de la Baie—des Sauteurs, Mississigués, Amikoués, etc., de la baie Georgienne, sans oublier des Outaouas du saut Sainte-Marie qui nous paraissent avoir été les chefs de cette expédition.

" Le sixième jour du mois d'août 1654, deux jeunes Français, pleins de courage, ayant eu permission de monsieur le gouverneur du pays (Jean de Lauzon) de s'embarquer (à Québec) avec quelques-uns de ce peuple (les Outaouas) firent un voyage de plus de cinq cents lieues..... Ils pensaient bien retourner au printemps de l'année 1655, mais ces peuples ne les ont ramenés que sur la fin d'août 1656. Leur arrivée a causé une joie universelle à tout le pays, car ils étaient accompagnés de cinquante canots chargés de marchandises que les Français vont chercher en ce bout du monde. Cette flotte marchait gravement et en bel ordre, poussée par cinq cents bras sur notre grand fleuve, et conduite par au-

tant d'yeux, dont la plupart n'avaient jamais vu les grands canots de bois, je veux dire les navires des Français. Ayant mis pied à terre au bruit étonnant des canons, et ayant bâti en un moment leurs maisons volantes, les capitaines montèrent au fort Saint-Louis pour aller saluer monsieur (Jean de Lauzon) notre gouverneur, portant leurs paroles en la main: c'étaient deux présents, qui passent pour des paroles parmi ces peuples. L'un de ces présents demandait des Français pour aller passer l'hiver en leur pays; et l'autre demandait des pères de notre compagnie, pour enseigner le chemin du ciel à toutes les nations de ces grandes contrées. On leur répondit à leur mode par des présents, leur accordant très volontiers tout ce qu'ils demandaient. Mais pendant que ceux qui sont destinés pour cette grande entreprise se préparent, apprenons quelque chose de nouveau des deux pèlerins français et de leurs hôtes.

"Premièrement, il est bon de remarquer que la langue huronne s'étend bien à cinq cents lieues du côté du sud, et la langue algonquine plus de cinq cents du côté du nord. Je sais bien qu'il y a quelque petite différence entre ces nations, mais cela consiste en quelques dialectes qu'on a bientôt appris et qui n'altèrent point le fond de ces deux langues. Secondement, il y a quantité de lacs au quartier du nord qui passeraient bien pour des mers douces, et le grand lac des Hurons et un autre (Supérieur) qui lui est voisin, ne cèdent point à la mer Caspie. En troisième lieu, on nous a marqué quantité de nations aux environs de la nation de Mer (les Puants de la baie Verte) que quelques-uns ont appelé les Puants, à cause qu'ils ont autrefois habité sur les rives de la mer qu'ils nomment Ouinipeg, c'est-à-dire eau puante. Les Liniouek (Illinois) qui leur sont voisins, sont environ soixante bourgades. Les Nadouesiouek en ont bien quarante. Les Pouarac (Sioux guerriers) en ont pour le moins trente. Les Kiristinons passent tous ceux-là en étendue: ils vont jusqu'à la mer du nord. Le pays des Hurons, qui n'avait que dix-sept bourgades dans l'étendue de dix-sept lieues ou environ, nourrissait bien trente mille personnes..... Disons en quatrième lieu, que ces deux jeunes hommes n'ont pas perdu leurs peines dans leur grande course; ils n'ont pas seulement enrichi quelques Français à leur retour, mais ils ont donné beaucoup de joie à tout le paradis, ayant baptisé et envoyé au ciel environ trois cents petits enfants." (*Relation* 1656, p. 39).

M. Charles Aubert de la Chesnaye, agent de la compagnie de traite de Rouen, était à Québec depuis une année. Dans un mémoire qu'il écrivit en 1696,[1] il raconte que les deux Français revenus en 1656 des contrées de l'ouest rapportaient, chacun, pour quatorze ou

[1] Et non pas en 1676 comme il est dit à la page 245 du tome I des *Documents sur la Nouvelle-France.*

quinze mille francs de pelleteries, sans compter qu'ils amenaient avec eux des sauvages portant des pelleteries pour cent mille écus. "Ils me firent procès, ajoute-t-il, pour s'exempter des droits du quart, parce qu'ils disaient qu'on leur avait l'obligation d'avoir fait descendre une flotte qui enrichissait le pays."

La Compagnie Rouen-la-Rochelle avait le monopole du commerce de la Nouvelle-France depuis 1654, mais elle était trop pauvre, et aussi trop peu entreprenante pour aller jusqu'au lac Supérieur chercher les fourrures que son privilège lui accordait à elle seule. C'étaient donc les particuliers qui pouvaient se charger des risques et des périls de ces sortes d'aventures et, lorsqu'ils réussissaient, la compagnie exigeait d'eux une remise de vingt-cinq par cent de la valeur marchande des peaux. Dans le cas qui nous occupe ici, les deux Français avaient été envoyés, équipés sans doute, par M. Jean de Lauzon, gouverneur général, et la chose paraîtra singulière qu'il refusât d'acquitter le droit légal du quart, mais souvenons-nous que Lauzon avait été l'âme des Cent-Associés; que voyant approcher la débâcle financière, il s'était fait nommer gouverneur (1651) afin de rétablir la situation de la compagnie; que, en 1654, il avait fallu céder le monopole de la traite à un syndicat de la Rochelle et de Rouen. Lauzon était donc simple gouverneur général et non plus directeur du commerce en 1654, lorsqu'il expédia ses deux hommes, aussi ne voulut-il pas reconnaître les prétentions des commerçants qui l'avaient supplanté.

Le voyage de 1654-56, qui tira de l'ouest des masses de pelleterie et attira immédiatement le trafic des peuples de la baie d'Hudson chez les Outaouas du lac Supérieur, sans compter la participation de la baie Verte, n'aurait pas eu lieu sans l'initiative de Lauzon qui voulait se refaire de ses pertes d'autrefois! L'été de 1656, ce gouverneur retourna en France, de son propre mouvement, et son fils le remplaça tant bien que mal.

"L'an 1656, dit la *Relation* de 1660, p. 29, une flotte de trois cents Algonquins supérieurs[1] venant ici en traite, nous donna espérance qu'en se jettant parmi eux nous pourrions remonter ensemble en leur pays et y travailler au salut de ces peuples. Deux de nos pères s'embarquèrent pour ce sujet, mais l'un fut obligé de rebrousser chemin, et l'autre qui était la père Léonard Garreau fut tué (sur l'Ottawa) par les Iroquois." Médard Chouart devait être de ce voyage, d'après ce que dit son beau-frère Radisson. Il aurait donc hiverné dans l'ouest.

Les "chemins coupés par les Iroquois" depuis 1648 se rouvraient sous l'initiative des Outaouas et des Hurons et, par la suite, le commerce des Français avec l'ouest ne devait se trouver interrompu ou

[1] Baie Verte, saut Sainte-Marie, côte d'Algoma.

gêné que rarement, quand la situation du Bas-Canada entravait trop les affaires, ou lorsque les Iroquois se décidaient à frapper un coup quelque part.

Ainsi donc, bientôt la grande traite de l'été descendrait du lac Supérieur, se joindrait aux gens de la baie Verte à la bouche de la rivière Sainte-Marie, passant par le nord de la baie Georgienne, la rivière des Français, le lac Nipissing, la rivière Mattawan, et l'ancienne rivière des Algonquins, pour arriver à Montréal, étant, par sa force même, à l'abri des attaques.

De là vint cette habitude de qualifier la rivière abandonnée pas les Algonquins de "route des Outaouas"— ce que l'on nomme à présent la rivière Ottawa."[1] Cependant le terme de "Grande Rivière" a toujours été le plus populaire depuis près de trois siècles. Le père Allouez écrivait en 1667 (*Relation*, p. 17), que les Outaouas, "prétendent que la grande rivière leur appartient et qu'aucune nation n'y peut naviguer sans leur consentement; c'est pour cela que tous ceux qui vont en traite aux Français (Montréal), quoique fort différents de nation, portent le nom général d'Outaouacs, sous les auspices desquels ils font ce voyage."

VIII

Chouart a-t-il été dans l'ouest avec les sauvages qui y retournaient en 1656? Voyons d'abord la marche de cette caravane: "Les Outaouas descendirent en gros aux Trois-Rivières. On leur donna des missionnaires: les Hurons eurent le Père Garot et les Outaouas le P. Mesnard,[2] avec cinq Français qui les accompagnèrent. Le Père Garot fut tué par la bande du Bâtard Flammand, qui (le Père Garreau) s'était embarqué avec les Hurons (et fut tué) sur le lac des Deux-Montagnes, où il (le Bâtard Flamand) avait fait construire un fort; mais ayant laissé passer le gros des Outaouas et des Saulteurs, qui étaient bien meilleurs canotteurs que les Hurons, ils (les Iroquois) les joignirent quoique bien éloignés d'eux, les défirent et en prirent plusieurs. Les Irroquois et les Français étaient alors en paix. Le Bâtard Flammand fit transporter le corps du père à Montréal, qui était alors déjà établi. On lui demanda, sitôt qu'il fut arrivé, pourquoi il avait tiré sur le père; il répondit que lui ni ses gens ne l'avaient pas tué; que c'était un Français qui, ayant déserté[3] de Montréal, était venu joindre son parti, dans le temps qu'il (le Bâtard Flamand) allait

[1] De 1615 à 1700 on la voit désignée sous le nom de rivière des Prairies, voir la carte de Sanson, année 1650.

[2] Non. C'était le père Dreuillette.

[3] Voir une note du Père Tailhan, p. 230 du *mémoire* de Perrot.

dresser des embuscades aux Outaouas, qui voulaient monter la rivière des Prairies.[1] Ce Français fut remis au gouverneur et passé par les armes,[2] faute d'exécuteur. Le Bâtard Flammand amena plusieurs prisonniers hurons, auxquels il fit brûler les doigts, sans aucune opposition de la part des Français, et leur accorda la vie quand il les eut rendus dans son village. Ils n'oublieront jamais la manière dont nous les avons abandonnés dans cette occasion à la discrétion de leurs ennemis." (Nicolas Perrot, p. 84.)

Comme le père Dreuillette, le frère Louis Le Boëme et les Français qui avaient persisté à les suivre jusqu'au-dessus de Montréal rebroussèrent chemin après l'attaque des Iroquois, devons-nous supposer que Chouart fut le seul à accompagner les sauvages dans leur pays, alors que nous ne savons pas même s'il formait partie du voyage?

Rien ne nous induit à croire que les Outaouas et les Hurons descendirent au Saint-Laurent l'année 1657, de sorte que Chouart n'aurait guère eu occasion de retourner aux Trois-Rivières, s'il était parti pour l'ouest en 1656[3]—pourtant Radisson nous dit que son beau-frère et d'autres Français étaient revenus des lacs en 1657.

La traite de 1657 se fit par le Saint-Maurice. Peut-être Chouart en était-il; cela justifierait Radisson. Voici ce que nous pouvons dire à ce sujet: Le 20 avril 1657, huit Français des Trois-Rivières, avec vingt canots d'Algonquins partaient par la rivière Batiscan, qui est à six ou sept lieues au-dessous de la ville. Ils passèrent vingt-huit sauts en quatorze jours et arrivèrent au terme de leur course le 28 mai, après avoir recontré soixante-quatorze sauts ou portages; ils rentrèrent aux Trois-Rivières le 15 juillet,[4] chargés de castors. "Ils virent des Poisson-Blancs (Attikamègues) qui demandent à prier Dieu, des Agouing8i8ek et des Kiristinons, qui sont proches de la mer du nord." (*Journal des Jésuites*, 15 juillet 1657.)

Le 17 novembre 1657, une chaloupe remplie de Sauvages arriva à Québec portant la nouvelle que plus de soixante canots chargés de pelleteries avaient abordé aux Trois-Rivières, qu'ils étaient en partie de la nation des Poissons-Blancs, et d'autres peuples plus au nord, dont quelques-uns n'avaient jamais vu d'Européens; ils étaient tous gens bien faits et de belle taille, mais d'une nature timide et peu

[1] C'était alors le nom de la rivière appelée plus tard Ontaoua, et Ottawa.

[2] Faillon: *Histoire de la Colonie*, II, 257.

[3] Ne pourrait-on offrir au lecteur le calcul suivant: Marie-Anne, fille de "Médard Chouard dit Des Groizeliers et Marguerite Haiets sa femme," née et baptisée aux Trois-Rivières le 7 août 1657, donne à penser que le père était en ce dernier lieu durant les mois de novembre-décembre 1656.

[4] Le 18 juillet 1657, Chouart est présent devant la cour, aux Trois-Rivières. Le 5 octobre suivant, il est parrain d'Ignace Aubuchon.

entreprenante. Ils avaient été attaqués par les Iroquois, deux ou trois années auparavant, dans leurs bourgades, à la hauteur des terres, et avaient cru prudent de se réfugier chez les autres nations plus éloignées. Pour aller à la mer du nord par le Saint-Maurice, la *Relation* dit que l'on va environ cent cinquante lieues, jusqu'au lac Ouapichiouanon; de là on va trouver la baie des peuples nommés Kilistinons qui sont sur la mer du nord. Du lac Ouapichiouanon on descend aux Trois-Rivières en sept journées. " Mais voici encore un nouveau chemin du pays des Hurons aux Trois-Rivières. " Sortant du lac nommé Temagami, c'est-à-dire eau profonde, que je crois être la mer Douce des Hurons et la source du grand fleuve Saint-Laurent; ayant fait quelque chemin sur ce grand fleuve, on traverse environ quinze lieues, par des petits ruisseaux, jusqu'au lac nommé Ouassisanik, d'où sort un fleuve qui conduit aux Trois-Rivières. C'est par ce chemin que vingt-cinq canots Nipisiriniens arrivèrent, il y a environ deux ans (1656) chargés d'hommes, de femmes, d'enfants et de pelleteries. Ils nous dirent qu'ils avaient trouvé partout de l'orignac ou des castors, ou des poissons, dont ils avaient fait leur nourriture. Ils nous assuraient qu'il serait facile à nos Français, partant des Trois-Rivières, de se rendre dans un mois à la mer Douce des Hurons." [1]

D'après notre manière de voir, Chouart a passé l'hiver de 1656-57 aux Trois-Rivières; il a pu former partie de l'expédition sur le haut Saint-Maurice, du 20 avril au 15 juillet 1657, mais Radisson n'en était pas puisque, à la fin de juin ou au commencement de juillet, il s'embarquait aux Trois-Rivières pour aller au pays des Iroquois (pages 87, 95, 97 de sa narration).

Au mois de juin 1657 on organisait à Québec un envoi d'hommes pour renforcer la petite garnison française établie chez les Onnontagués l'année précédente. Radisson se rendit à Montréal pour s'adjoindre à eux, car c'était l'endroit du rendez-vous général. Il dit qu'il s'écoula quinze jours avant l'embarquement (26 juillet) et qu'ils partirent au nombre de quatre-vingts Iroquois, une centaine de Huronnes, dix à douze Hurons, vingt Français et deux pères jésuites. La route se fit par le Saint-Laurent. A Onnontagué le major Zacharie Dupuis et ses trente soldats avaient construit un fort, mais la situation était devenue des plus alarmantes. Dès l'automne (1657) on eut connaissance d'un complot pour massacrer les Français, lequel, toutefois, fut suspendu en apprenant qu'une cinquantaine d'Onnontagués allaient passer l'hiver à Québec. Le 20 mars 1658, Dupuis convoqua les Sauvages à un grand festin et, les ayant gorgés, on profita de leur sommeil pour déguerpir à la faveur

[1] *Journal des Jésuites*, 17 novembre 1657; *Relations*, 1658, pp. 12, 20-21; 1660, p. 12.

de la nuit aussi bien que d'une tempête de neige qui effaçait les traces des fugitifs. Ils étaient 53 hommes, dont 3 périrent dans le voyage. Radisson (pp. 126, 128, 130, 131, 133, 134) dit qu'ils furent six semaines à descendre, puis il ajoute qu'ils arrivèrent à Montréal à la fin de mars, mais nous savons que c'était le 3 avril.

La débâcle du fleuve avait lieu en ce moment. Peu de jours après, Radisson était aux Trois-Rivières. Chouart[1] et lui résolurent d'aller à la découverte des grands lacs dont parlaient les aborigènes "et qui ont été vus, car mon beau-frère y a fait plusieurs voyages du temps que les pères jésuites demeuraient vers le lac des Hurons, sur le bord de la mer" (p. 134). Tout ceci est conforme à l'histoire, excepté la mer et ses rivages.

Le mystère de l'ouest était déjà passablement débrouillé si l'on en juge par la lettre de la Mère de l'Incarnation du 24 septembre 1654, signalant le Mississipi, sans le nommer, et les *Relations* des pères jésuites de 1654 à 1658 énumérant les peuples lointains dont on avait connaissance, toutefois, le marasme dans lequel végétait le Bas-Canada empêchait de donner suite au mouvement commercial inauguré par les Outaouas, les Hurons, les Sauteurs et les Nipissiriniens. M. Jean de Lauzon, dépité de ses insuccès, était retourné en France l'été de 1656, laissant les affaires à un de ses fils qui les passa, l'année suivante, à M. d'Ailleboust, en attendant une décision de Paris. Le 11 juillet 1658, M. d'Argenson arriva, mais sans troupes, sans argent, sans ressources d'aucune sorte. Il ne voulut voir—avec raison—que la nécessité immédiate d'entraver ou d'anéantir la puissance des Iroquois et il rédigea des mémoires dans ce sens—on les laissa dormir dans les bureaux de Paris. L'amalgame ou replâtrage commercial qui se nommait depuis trente ans les Cent-Associés, depuis vingt ans la compagnie Cheffault, depuis 1644 la société des Habitants, depuis 1655 le syndicat Rouen-Rochelle, tous rouages les uns dans les autres, ne valait absolument rien.

Deux hommes surgirent à point pour créer un prestige français dans les régions de l'ouest. Nous allons les voir à l'œuvre.

IX

C'est à la mi-juin 1658,[2] rapporte Radisson (p. 136), que Chouart et lui s'embarquèrent aux Trois-Rivières avec deux pères jésuites, vingt-neuf Français, et des Outaouas, Hurons, Amikoués, Sauteurs, qui re-

[1] Le 12 avril 1658, aux Trois-Rivières, il est parrain d'Ignace Pellerin dit Saint-Amant.

[2] Marguerite, fille de Chouart, étant née aux Trois-Rivières le 15 avril 1659, nous supposons que le départ ci-dessus doit plutôt compter du 15 juillet, au moment où M. d'Argenson venait d'arriver de France.

tournaient dans leurs pays respectifs après la traite. Les "vingt-neuf gaillards" se targuaient de faire un voyage de conquérants, de quoi Radisson se moque avec entrain, disant que tout cela est fort bon lorsque l'on parle des dangers, des peines et des misères que l'on ne connaît pas; il leur prédit qu'ils baisseront leur caquet une fois soumis à l'épreuve, comme cela est arrivé (p. 141).

On ne passa pas, malgré la coutume, par le bras de rivière qui baigne l'île de Montréal au nord, car il fallait se rendre à la ville pour y prendre huit Outaouas et deux Français qui attendaient cette occasion. "Sans cela, nous serions allés par la rivière des Prairies." (p. 137).

La rivière des Prairies portait ce nom depuis quarante ans et, le plus souvent, on désignait ainsi toute la rivière des Algonquins qui prit le nom de route des Outaouas vers 1670. Le bras de cette rivière qui passe entre l'île Jésus et la terre-ferme du nord et dont notre voyageur parle ici spécialement, porta aussi (1640) le nom de Saint-Jean, en honneur de l'interprète Jean Nicolet.

Les Iroquois qui, depuis 1650, étaient maîtres de ces régions, en ayant chassé les Algonquins, ne tardèrent pas à se montrer dès que la flottille eut quitté le lac Saint-Louis pour se diriger à l'ouest. Au lac des Deux-Montagnes et aux approches du Long-Saut, il y eut des escarmouches. Les sauvages agissaient sans discipline, se débandaient, s'exposaient inutilement, de sorte qu'il en périt treize, tant tués que prisonniers. Les "gaillards," voyant cela, rebroussèrent chemin, laissant Chouart et Radisson seuls avec les Sauvages épouvantés (p. 141). Heureusement, les attaques ne se renouvelèrent pas et l'on parvint "in a place called the lake of Castors, which is some 30 leagues from the first great lake" (p. 143). Ce premier grand lac est la baie Georgienne. Dans un autre endroit de ses écrits (p. 90) notre voyageur observe: "Neere the lake of the Hurrons some 40 leagues eastward there is another lake belonging to the nation of the Castors, which is 30 miles about." C'est le lac Nipissing, qui portait les deux noms de Castors et Sorciers à cause des Nipissirininens et des Nez-Percés ou Amikoués qui demeuraient dans son voisinage. Amikoué veut dire castor, aussi Nicolas Perrot et autres de la même époque les désignent-ils parfois sous ce nom. Rendus là, ils avaient fait soixante portages depuis Montréal (p. 144) et ils prirent quelques jours de repos, car il y avait abondance de poisson dans le lac.

La décharge du lac des Castors, qui mène au lac Huron, mesure trente lieues en longueur et compte huit chutes ou rapides, remarque Radisson (p. 144). Dans son voyage de 1661 (p. 186) il l'appelle la rivière des Sorciers, un nom connu depuis 1613, à cause des Nipissiriniens surnommés le peuple des Sorciers. Nous tenons à noter ces petits faits, comme aussi la mention des soixante portages, pour faire

voir que la route se fit par l'Ottawa et non pas par le Saint-Laurent, les lacs Saint-François, Ontario et Erié, comme plusieurs le prétendent.

A la sortie de la rivière des Sorciers ou des Français, la flottille se divisa en deux bandes: l'une de sept canots, allant vers la côte nord ou Algoma, où devaient s'arrêter les Amikoués, tandis que les gens du saut Saint-Marie et les Outaouas pousseraient plus loin pour se rendre chez eux; l'autre, composée de Hurons, inclinant au sud, en côtoyant les rivages de la baie Goergienne. Avec ces derniers étaient Chouard et Radisson. "We saw by the way the place where the ffathers Jesuits had heretofore (de 1634 à 1650) lived, a delicious place, albeit we could but see it afarre off" (p. 145). Une fois de plus, il faut reconnaître qu'il n'y a rien du lac Erié ou du lac Sainte-Claire dans ces descriptions.

Nos deux explorateurs arrivèrent au village des Hurons qui étaient avec eux; c'était sur l'une des îles Manitoulines (p. 146). Ces familles huronnes avaient fui en 1650 de la baie de Penetenguishine pour ne pas être massacrées par les Iroquois.

Chouart et Radisson, apprenant qu'il y avait dans le voisinage un parti d'Iroquois, induisirent les guerriers hurons à leur donner la chasse, ce qui eut lieu avec succès: "We gave them the assault when they least thought of it. We played the game so furiously that none escaped. The day following we returned to our village with 8 of our enemys dead and 3 alive. The dead weare eaten and the living weare burned with a small fire to the rigour of cruelties." (p. 147.)

Aux îles Manitoualines il y avait des Cheveux Relevés ou *Staring Hairs*, comme Radisson les appelle, mais il ne semble pas les apparenter avec les Outaouas, pourtant c'était la même nation.

En visite chez ce peuple, nos voyageurs apprirent que les Poutéouatamis, occupant le nord-ouest de la baie Verte, désiraient les recevoir, et ils se rendirent chez eux dans l'intention d'y passer l'hiver.[1] Une fois là, ils firent connaissance avec des Escoteckes[2] ou Nation du Feu peuples établis sur la rive sud-ouest de la rivière aux Renards, quelque part vers le comté de Green Lake, Wisconsin. Ce peuple avait été chassé des environs du lac Sainte-Claire (côté sud) par les Iroquois, en 1656, et s'était rapproché du passage de Michillimakinac, avait passé à la baie Verte et s'était enfin fixé à la rivière du Loup qui se déverse dans le lac Winnepagoes, en haut de la rivière aux Renards, à neuf milles du coude de la rivière Wisconsin, et il

[1] Radisson dit que c'est le plus beau pays du monde (p. 150).

[2] Radisson a dû écrire Mascotekes. Ce terme signifie terrain de plaine en langue algonquine. Les Hurons et les Iroquois les appelaient Atsistagherronnons ou Gens du Feu, et Ontaougannha: ceux qui parlent mal. Les Français disaient Maskouteng, Macoutenks, Mascoutins.

s'étendait jusqu'à Milwaukee et Chicago. En 1658 il comptait trente bourgades situées "au sud-ouest quart de sud, à six ou sept journées de Saint-Michel" (mission des Poutéouatamis).[1] En 1670-72, il était encore dans le même pays.[2]

Au printemps de 1659, dit positivement Radisson, lui et Chouart, s'avancèrent jusqu'à ce peuple, qui leur parla des Sioux, et même des Christinos, nation errante des bords de la baie d'Hudson dont une partie passait les hivers au sud du lac Supérieur. (pp. 146, 148-9.) L'objet de nos deux aventuriers étant de trouver le pays des fourrures par excellence, ils questionnaient les Sauvages et se faisaient raconter l'état des choses dans les contrées qu'ils n'avaient pas encore vues.

Il faut omettre les réceptions enthousiastes des Cheveux-Relevés, des Poutéouatamis et des Mascoutins, pour s'en tenir à la pensée qui dominait nos explorateurs, c'est-à-dire la découverte de territoires de plus en plus vastes, contrées du castor et des belles pelleteries en général. Les Mascoutins offraient de les conduire jusqu'aux Christinos, mais Radisson (p. 149) observe que cela ne pouvait entrer que plus tard dans son programme: "We desired not to goe to the North till we had made a discovery in the South, being desirous to know what they did."

X

Ici se pose un problème: savoir si Radisson est parti du village des Mascoutins pour se rendre au Mississipi. La narration qu'il donne de ce voyage se trouve intercalée, sans à propos, dans la descente de l'Ottawa en 1660 (p. 167-9) où elle est manifestement hors de place. Il y a un fait incontestable, c'est que le récit en question nous mène au grand fleuve; reste donc à savoir quand eut lieu le voyage. Nous verrons, par la suite, que ce devait être au printemps de 1659, puisqu'il n'y a pas moyen de le placer à une autre date durant les années 1658-60. On a voulu que ce fût durant l'hiver de 1659-60, alors que Chouart et Radisson exploraient le lac Supérieur et le pays des Sioux, mais, outre que la chose n'était pas possible sur les neiges, le Mississipi vu par Radisson était plus bas que le lac Pepin et il lui donne une largeur "comparable à notre Saint-Laurent" d'après la *Relation* de 1660, p. 12. Ce n'est plus le Mississipi des Sioux, qu'il eut toutefois occasion de voir six mois plus tard.

Chouart ne fut pas du voyage, on ne dit pas pourquoi. Peut-être a-t-il alors exploré Milwaukee et Chicago, dont il n'était pas éloigné.

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[1] Le nom était donné, mais il n'y avait encore aucun missionnaire dans l'ouest.

[2] *Relations*, 1632, p. 14; 1640, pp. 35, 98; 1641, p. 59; 1644, p. 98; 1647, p. 77; 1658, p. 22; 1670, pp. 94, 97, 99; 1671, pp. 25, 42-5; 1672, p. 41.

Au milieu des Mascoutins, Radisson a dû apprendre que la rivière Wisconsin avait servi de route aux Hurons et aux Outaouas pour se rendre à l'ouest peu d'années auparavant, de même aussi que les Illinois, sauf une ou deux tribus, s'étaient réfugiés au-delà du Mississipi en 1656. Les Sauvages qui s'embarquèrent avec lui ne faisaient pas mystère de l'existence du Mississipi. Il a dû connaître d'avance le lac Pepin et l'île Pelée. Partant du voisinage du lac Winnipagoes on a moins de difficultés pour rencontrer le grand fleuve qu'en allant à lui par le nord-ouest du Wisconsin. Le voyage avait lieu en canot, ce qui n'eut pas été possible au printemps de 1660, puisque nos voyageurs étaient alors au sud-ouest du lac Supérieur. La lacune d'avril-juillet 1659, qui se trouve visiblement dans le récit de Radisson, doit être comblée par le passage inséré sans à propos vers la fin de l'écrit, et qui paraît comme s'appliquant à Carillon, le Long-Saut, le lac des Deux-Montagnes, on ne saurait dire à quoi au juste, car le morceau arrive là par hasard. Il est temps de le remettre à sa place.

Rappelons-nous que, en 1634, Jean Nicolet s'était vu dans la même situation. Les indigènes lui expliquaient l'existence d'un portage, après quoi on entrait dans une rivière (la Wisconsin) qui, en trois jours, conduisait aux "grandes eaux" et, sans y aller, il conjecturait que ce devait être la mer. Radisson était mieux renseigné; il savait très bien qu'il allait visiter la vallée d'un grand cours d'eau et reconnaître les rivières qui s'y déchargent. Voici sa narration:

"We weare 4 moneths in our voyage wthout doeing anything but goe from river to river.[1] We mett several sorts of people. We conversed wth them, being long time in alliance wth them. By the persuasion of som of them we went into ye great[2] river that divides[3] itselfe in 2, where the hurrons with some Ottanake[4] & the wild men that had warrs wth them had retired.[5] There is not great difference in their language, as we weare told. This nation have warrs against those of (the) forked river. It is so called because it has 2 branches, the one towards the west,[6] the other towards the South, wch we believe runns towards Mexico,[7] by the tokens they gave us. Being among these people, they told us the prisoners they take tells them that they

[1] Ce n'était pas un voyage en raquettes comme on le prétend dans quelques ouvrages.

[2] Le Père Allouez la nomme Missipi en 1665; c'est la première mention du nom.

[3] La fourche du Mississipi et de la rivière Wisconsin ou du Missouri.

[4] Radisson a dû écrire Ottauake.

[5] Sur l'île Pelée, de 1655 à 1657.

[6] Ce serait le Missouri.

[7] En 1673, Marquette et Jolliet faisaient le même rapport.

have warrs against a nation, against men that build great cabbans, & have great beards & had such knives as we have had. Moreover they shewed a Decad of beads & guilded pearls that they have had from that people, wch made us believe they weare Europeans. They shewed one of that nation that was taken the yeare before. We understood him not; he was much more tawny then they wth whome we weare. His arms & leggs weare turned outside; that was the punishment inflicted uppon him. So they doe wth them that they take, & kill them wth clubbs & doe often eat them. They doe not burne their prisoners as those of the northern parts.

"We weare informed of that nation that live in the other river. These weare men of extraordinary height & bignesse, that made us believe they had no communication wth them. They live onely uppon Corne & Citrulles, wch are mighty bigg. They have fish in plenty throughout ye yeare. They have fruit as big as the heart of an Oriniak,[1] wch grows on vast trees wch in compasse are three armefull in compasse. When they see little men they are affraid & cry out, wch makes many come help them. Their arrows are not of stones as ours are, but of fish boans & other boans that they worke greatly, as all other things. Their dishes are made of wood. I have seene them, could not but admire the curiosity of their worke. They have great calumetts of great stones, red & greene. They make a store of tobacco. They have a kind of drink that makes them mad for a whole day. This I have not seene, therefore you may believe as you please. When I came backe I found my brother sick, as I said before.[2] God gave him his health, more by his courage then by any good medicine, ffor our bodyes are not like those of the wildmen." (pp. 167-169.)

L'allusion à l'île Pelée où les Hurons et les Outaouas s'étaient retirés, et d'où ils étaient partis récemment, montre que Radisson est remonté au nord jusqu'au lac Pepin. Rien dans son texte ne donne à supposer qu'il ait séjourné en cet endroit. Il dit qu'il a employé les quatre mois allant de rivière en rivière.

Le chemin de fer d'Omaha s'avance dans le Wisconsin jusqu'à la rivière Chippewa, à 40 miles du lac Rice, et cet endroit, qui va devenir un centre commercial, a été nommé Radisson en 1902.

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[1] Orignac est un mot basque pour désigner un grand cerf. Nous en avons fait orignal.

[2] Page 158, mais ce passage, où il dit que Chouart tomba malade, se trouve intercalé dans un endroit qui nous mène à l'été de 1661. Il serait bon de voir le manuscrit original.

XI

La page 149 présente une contradiction flagrante. Radisson déclare qu'il n'ira pas au lac Supérieur comme les Mascoutins le lui demandent, parce qu'il est décidé de voir le sud qui l'avait tenté et attiré jusque-là. A peine a-t-il fini cette explication, qu'il fait ses préparatifs pour aller au saut Sainte-Marie. Il y a évidemment un passage du manuscrit qui manque, et ce morceau se retrouve page 167 où il arrive sans raison aucune en parlant du bas de la rivière Ottawa. Nous venons de le reproduire. Il dit que le voyage au Mississipi avait duré quatre mois, donc c'est en juillet 1659, après son retour du Mississipi, que Radisson consent à suivre les Mascoutins vers le nord, ainsi qu'il se l'était toujours proposé.

Il débute par ces mots: "They (les Mascoutins) told us that if we would goe with them to the great lake of the stinkings (la baie Verte) the time was come of their trafick, which was of as many knives as they could gett from the french nation, because of their dwellings which was att the coming in of a lake called Superior, but since the destructions of many neighboring nations they (les Français) retired themselves to the height of that lake (en effet, les traiteurs français s'étaient reculés jusqu'aux îles des Apôtres, au sud-ouest du lac Supérieur où étaient les Outaouas). We knewed those people well. We (les Français) went to them almost yearly, and the company that came up with us weare of the said nation, but never could tell punctually where they lived because they make the barre of the Christinos from whence they have the Castors that they bring to the french." (p. 149.) Les Outaouas voulaient garder le monopole de la traite et ne répondaient guère à ceux qui cherchaient à se renseigner sur leur nouveau pays.

Chouart et Radisson paraissent avoir quitté le pays des Mascoutins en juillet 1659, puisque dans le trajet de la baie Verte, du lac Michigan et du détroit de Michillimakinac Radisson écrit quatre pages pour exprimer son ravissement des beautés de la nature et parler des fruits qui couvrent les arbres (p. 150-153). Il ajoute: "The summer passed away with admiration by the diversity of the nations that we saw, as for the beauty of the shore of that sweet sea."

Arrivé au saut Sainte-Marie, il explique que les Mascoutins ayant terminé leur traite, voulaient le ramener chez eux, mais il était décidé de voir les Christinos (p. 153). Durant l'été, il observait au cours de sa narration (p. 152) qu'il n'avait encore rencontré aucun Sioux; que lui et son compagnon étaient résolus de ne retourner au Canada que l'année suivante (1660), et il ajoute qu'il proposa aux Hurons qui étaient avec lui d'aller visiter les réfugiés de leur race établis à sept

ou huit journées ouest de la baie Verte, aux sources de la rivière Noire, après avoir abandonné l'île Pelée sur le Mississipi — ce qui ne fut pas accepté (p. 152). L'endroit en question est assez proche des sources de la rivière Wisconsin, à six journées (40 ou 50 lieues), sud du lac Supérieur. Ces Hurons réfugiés étaient comme nous l'avons exposé, les gens du Petun qui se tenaient, depuis 1650, avec nombre d'Outaouas, mais ces derniers n'avaient pas voulu s'arrêter aux sources de la rivière Noire (1657), ils s'étaient rendus à la Pointe, qui est une des îles des Apôtres dans le lac Supérieur, côté sud-ouest, dans la baie de Chagouamigon.

XII

Au saut Sainte-Marie, Radisson note: "We found some french men y^t came up with us, who thanked us kindly for to come & visit them." Cette expression "came up with us" ne signifie pas qu'ils étaient venus ensemble du Bas-Canada l'année précédente, mais qu'ils accompagnèrent nos deux découvreurs, partant du saut Sainte-Marie jusque chez les Sioux (p. 155) à l'ouest du lac Supérieur, comme nous le verrons bientôt.

Les Panoestigonces [1] ou peuple du Saut avaient eu, les années dernières, une guerre cruelle contre les Sioux et, bien que très inférieurs en nombre, ils s'en étaient assez bien tirés, avec l'aide des Christinos, toutefois. (p. 154.)

L'été qui venait de finir, les Christinos avaient livré une grande bataille aux Sioux et voyant que la haine était encore vivace entre eux, Radisson et Chouart abandonnèrent l'idée de se rendre chez les Christinos pour les réconcilier avec leurs ennemis (p. 157). Ce voyage eut lieu en 1662 seulement.

Durant son séjour au lac Supérieur, Radisson ne parle pas d'une visite qu'il aurait faite à la baie Verte en octobre; cependant lorsqu'il raconte son séjour dans le détroit de Michillimakinac, l'été précédent (p. 153), il donne une description de la baie et termine en disant que, au sujet des Sauvages de ces lieux, "I will speake of their manners in my last voyage, which I made in October."

C'est donc après cela qu'il partit du saut Sainte-Marie avec les Français qu'il y avait rencontrés, et s'avança jusqu'au fond du lac Supérieur, vit les Outaouas de la Pointe, et obtint des renseignements (du moins nous le croyons) sur la bourgade huronne établie aux sources de la rivière Noire qu'il aurait tant aimé à visiter.

A ce propos il y a dans la *Relation* des pères jésuites de 1660, p. 27, un passage annonçant que la nation huronne du Petun, réfugiée à 60

[1] Pawestigonces et Pawitagouek en algonquin.

lieues ouest de la baie Verte, avait envoyé, en 1659, un de ses capitaines à Québec pour engager les Français à aller les voir, disant qu'ils se croyaient en sûreté au milieu de plusieurs peuples de langue algonquine, et sur cette nouvelle, deux Français se proposaient de faire le voyage en 1661. A son tour, le *Journal des Jésuites* du 1er août 1659 note ceci: "Arriva des Trois-Rivières un canot qui porta nouvelles que 33 canots étaient arrivés des terres, partie Attikameg, Piskitang; entre autres 6 canots de la nation du Sault, Misisager. Lesquels six canots du Sault descendirent par les terres et y rencontrèrent les Poissons Blancs (du haut Saint-Maurice) y furent 5 mois en leur voyage. Ils demandent des français pour les escorter en leur retour."

Ces deux expéditions de canots de traite n'ont pas été inspirées par Chouart et Radisson puisque ces deux hommes étaient chez les Mascoutins au moment où les Hurons du Petun et les Gens du Saut partaient du lac Supérieur pour Trois-Rivières et Québec.

Or, comme le père Jérôme Lalemant déclare (*Relation*, 1660, p. 12) que nos deux voyageurs ont vu les Hurons de la rivière Noire, il nous faut placer cette visite à l'automne de 1659.

Chouart et Radisson avaient rencontré au saut Sainte-Marie des Christinos ou Cris qui venaient trafiquer en ce lieu, selon leur coutume depuis deux ou trois ans, et les pelleteries qu'ils vendaient aux gens du saut étaient descendues sur le Saint-Laurent par les canots de la grande traite annuelle de ces sauvages et des Outaouas de la Pointe.

Comme ou parlait des Iroquois qui pouvaient survenir à tout moment et attaquer le village du Saut, Chouart et Radisson s'étaient décidés à aller passer l'hiver chez les Sioux (p. 155) "where we weare well receaved. . . . Th wild Octauacks that came with us found some of their nations slaves, who weare also glad to see them.... There we passed the winter and learned the particularities that since we saw by experience." La saison des neiges s'écoula à la chasse. "We did what we could to have correspondence with that warlike nation and reconcile them with the Christinos." (p. 157.)

Chouart et Radisson hivernèrent de nouveau chez les Sioux en 1661-62, et plusieurs historiens ont confondu ces deux faits pourtant bien distincts l'un de l'autre. Les deux pages que Radisson consacre à son séjour dans cette contrée durant l'hiver de 1659-60, sont presque uniquement remplies de descriptions de chasse; à part cela, il parle des Christinos, mais rien des Hurons de la rivière Noire, pas un mot du Mississipi. Il est possible que l'endroit central de ses courses fut Kathio, ville située sur la rive occidentale du lac Mille-Lacs; et, pour peu qu'il ait marché à l'ouest, il a dû rencontrer le fleuve, qui mesure de cent à deux cents pieds de largeur dans cette direction. Peut-être aussi a-t-il fréquenté la région qui est au sud de la Pointe, alors il a pu voir les

Hurons des sources de la rivière Noire. Si nous n'avions pas le résumé de ses confidences aux pères jésuites de Québec, puis l'exploration des mois d'avril-juillet 1659 au lac Pepin, l'hivernement de 1659-60 près du lac Supérieur éveillerait moins l'attention.

XIII

Voyons le retour des deux explorateurs: " Two years weare expired.[1] Wee hoped to be att the 2 years end with those that gave us over for dead." (p. 157).... We made guifts one to another, and thwarted a land of allmost 50 leagues before the snow was melted. In the morning it was a pleasure to walke, for we could goe without racketts. The snow was hard enough, because it freezed every night.[2] When the sun began to shine we payed for the time past. The snow sticks so to our racketts that I believe our shoes weighed 30 pounds, which was a paine, having a burden uppon ous backs besides. We arrived, some 150 of us, men and women, to a river side,[3] where we stayed 3 weeks making boats. Here we wanted no fish. During that time we made feasts att high rate. So we refreshed ourselves from our labours. In that time we tooke notice that the buds of trees began to spring, which made us to make more hast and be gone. We went up that river [4] 8 days till we came to a nation called Poutouatenick and Matouenock; that is the Scratchers.[5] There we gott some Indian meale & corn from those 2 nations, which lasted us till we came to the first landing Isle.[6] There we weare well received againe. We made guifts to the elders to encourage the yong people to bring us downe to the ffrench. But mightily mistaken; ffor they would reply, " Should you bring us to be killed?" (pp. 157-8).

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[1] Aux pages 134, 148, il dit qu'ils furent trois ans dans leur absence; page 170 il met trois ans et quelques mois. Il faut se limiter à vingt-cinq mois, du départ des Trois-Rivières à la rentrée dans cette place.

[2] Le printemps de cette région se comporte identiquement comme celui de Montréal et Ottawa, quant à la date, à la neige, aux nuits froides et aux éclats du soleil le jour.

[3] L'une des rivières qui tombent au lac Supérieur, rive sud, probablement Nantounagan de la carte des jésuites, 1670-71; à présent Ontonagan.

[4] En remontant le cours d'eau qui se décharge au lac Supérieur, on arrive à une hauteur de terre et de l'autre pente coule une rivière qui se déverse dans la baie Verte.

[5] Ceci ne laisse pas de doute sur l'itinéraire en question. Les Poutéouatamis et les Mantoue vivaient au nord-ouest à la baie Verte. C'est par la rivière Malomine que nos voyageurs débouchèrent dans la Baie.

[6] Sans doute l'une des îles à l'entrée de la baie Verte. Nous dirons l'île Huronne déjà mentionnée.

On craignait les Iroquois. Radisson ajoute: "Our journey was broaken till next year, & must per force," (p. 158). Mais cela signifie seulement que le voyage pouvait se trouver retardé d'un an — et il ne le fut pas puisque, sans expliquer pourquoi, à la page suivante, il dit qu'on se préparait à partir. Dans l'intervalle, Chouart avait amassé du blé d'inde, prévoyant la pénurie ordinaire des vivres sur la rivière Ottawa. Tout ceci avait lieu à la baie Verte, croyons-nous, malgré que le texte des dernières douze lignes de la page 158 soit fort diffus; on y trouve même un passage qui paraîtrait se rapporter à l'hiver de 1658-59 chez les Poutéouatamis et qui parle de Chouard comme étant devenu malade. Peut-être que cette incommodité fut la cause qu'il n'alla point au Mississipi avec Radisson.

Cet été, dit encore Radisson (p. 158), voyant que l'on ne partait pas pour le Canada, je m'employai à la chasse. Il dit vrai puisque le départ n'eut lieu que le 24 juillet.

Brusquement, il annonce (p. 159) que 500 hommes voulaient s'embarquer. D'où provenait ce changement de résolution? Rien ne nous l'explique. Puis, au milieu des préparatifs de l'expédition, arrive cette note, qui met le désarroi parmi les sauvages: "When we weare ready to depart, heere comes strange news of the defeat of the hurrons, which news, I thought, would putt off the voyage." (p. 159). Voyons ce qui en était. Durant le mois de mai venait d'avoir lieu le siège du Long-Saut, sur l'Ottawa, quelques milles au-dessus de Montréal, où les Hurons, des Algonquins et 17 Français commandés par Dollard des Ormeaux, avaient péri après une glorieuse défense de trois semaines qui dérangeait les plans de 700 Iroquois en marche contre Montréal. La nouvelle de ce fait d'armes paraît avoir été connue à la baie Verte en juillet et c'est à quoi notre explorateur fait allusion. La rivière Ottawa restait au pouvoir des Iroquois, comme elle l'avait toujours été depuis dix ans que les Algonquins en étaient partis sous le coup de la terreur inspirée par le bannissement des Hurons.

Chouart et Radisson déployèrent toute leur éloquence pour entraîner ceux qui avaient amassé des pelleteries afin d'aller les vendre aux Français, et il y en avait beaucoup (p. 162). Après de longs pourparlers, bien des hésitations et un grand conseil, on décida l'entreprise. Tout ceci nous paraît avoir eu lieu sur l'île Huronne.[1] Des émissaires ont dû être envoyés au lac Supérieur et à la côte du nord du lac Huron pour avertir ceux qui voudraient en former partie. La flottille se mit en route le 24 juillet, soit du détroit de Michillimakinac, soit de la bouche de la rivière Sainte-Marie et, à mesure que les nouveaux venus

[1] Un grand débat sur ce point et d'autres, relativement à l'itinéraire de Radisson, occupe en ce moment les historiens de l'ouest. Voyez le *Mémoire* officiel publié en mars dernier par l'honorable J. V. Brower, de Saint-Paul.

s'ajoutaient à la bande, on suivait la côte du nord pour arriver à la rivière des Français, mais la crainte des Iroquois empêcha deux cents Sauvages de continuer la route, de sorte que soixante canots seulement risquèrent l'aventure. Les 300 hommes de la troupe comptaient des Hurons, Amikoués, Algonquins, Outaouas, Panoéstigons, Nadouicinagos, Ticaton (p. 164) qui tous étaient compris, dans le Bas Canada, sous le nom générique d'Outaouas.

Jusqu'aux Calumets (p. 163) au-dessous de l'île des Allumettes, tout alla bien; ensuite (au lac des Chênes) les ennemis les harcelèrent jusqu'à Montréal (pp. 163-7, 169-70) où nos voyageurs apparurent le 19 août.

Dans le récit de Radisson on aprend que le canot de Chouart versa, mais sans perdre un homme (p. 167). Par la narration du voyage de 1663 (p. 232) on voit que cet accident eut lieu au Long-Saut.

A la fin de cette même page 167 se rencontre, sans avertissement, le rapport de la découverte du Mississipi, l'été de 1659, et il se termine au milieu de la page 169.

Autre remarque: On a vu que, le mois précédent, Radisson avait appris, à la baie Verte ou à Michillimakinac, la nouvelle du siège du Long-Saut. Il n'en dit rien à la page 167, mais il en a dressé l'histoire en détail, puisqu'il la place (p. 232) dans sa descente de l'Ottawa en 1663. Cette action, dit-il, fut notre salut puisque, sans cela, nous tombions aux mains des Iroquois. Où il se trompe c'est quand il note que l'affaire avait eu lieu huit jours avant son passage; or il y avait au moins quatre-vingt-cinq jours, et même s'il a confondu 1663 avec 1660, disons que, en 1663, il passait au Long-Saut le 22 juillet, ce qui donne encore soixante jours d'écart.

Après avoir chassé une bande d'Iroquois du Long-Saut, la flottille arriva à Montréal, où vingt Canadiens les attendaient avec un brigantin venant de Québec ou des Trois-Rivières. Après trois jours de repos, tous se mirent en route pour descendre le fleuve et, près de "la rivière des Prairies," à Repentigny, les Iroquois se présentèrent de nouveau, mais les petits canons du brigantin les tinrent en respect (p. 169).

XIV

Le *Journal des Jésuites*, à la date du mois d'août 1660, porte que "Les 8ta8at estoient arrivés à Montréal le 19, qui en partirent le 22, & arrivèrent aux Trois-Rivières le 24, en partirent le 27. Ils étaient au nombre de 300. Des Grosiller estoit à leur compagnie, qui y estoit allé l'année d'auparavant (non: en 1658). Ils estoient partis du lac Supérieur (pas tous) 100 canots; 40 rebrousserent chemin, & 60 arriverent icy chargés de pelleteries pour 200,000 livres; ils en laisserent

pour 50,000 livres à Montréal, porterent le reste aux Trois-Rivières. Ils vinrent de là en 26 jours, & furent deux moys à monter. Des Grosillers a hyverné à la nation du Bœuf,[1] qu'il fait de 4 mille hommes; ce sont les Nad8esseronons sedentaires."

"We came to Quebecq, where we are saluted with the thundring of the guns & batteryes of the fort, and of the 3 shipps that weare then att anchor, which had gone back to france without our castors if we had not come. We weare well traited for 5 dayes. The Governor made guifts & sent 2 Brigantins to bring us to the 3 rivers, where we arrived the 2nd day of, & the 4th day they went away." (Radisson, p. 170). Chouart[2] et Radisson rentrèrent donc aux Trois-Rivières le 3 ou le 4 septembre, et les Sauvages en repartirent le 7.

Nos deux voyageurs se reposèrent aux Trois-Rivières le reste de l'année (p. 172). Le 18 septembre 1660, dans ce lieu, Petrus Radisson est parrain de Marie-Jeanne Pellerin dit Saint-Amand. Ici, comme dans vingt circonstances faciles à citer, on voit que Radisson et Chouart étaient catholiques.

La découverte du Mississipi en 1659 est réelle et prime toutes les autres, que l'on parle de la Salle en 1669 ou de Jolliet et Marquette en 1673. Elle a eu un retentissement assez profond, tout d'abord. Sans la jalousie des marchands de fourrures, hostiles à Chouart et Radisson, cette route restait ouverte. L'aveuglement des traiteurs, le jeu des intérêts du moment suspendirent la suite des opérations qui devaient en découler. Les deux explorateurs, eux-mêmes, tournèrent le dos à toute entreprise de ce côté, parce que le pays des Christinos les attirait davantage. Désormais, leur but était la baie d'Hudson, et ils en donnèrent la preuve dans leur voyage de 1661-1663. Contentons-nous ici de faire voir l'étonnement de la petite population (à peine 2,000 âmes) du Bas-Canada, en apprenant la découverte d'un nouveau fleuve Saint-Laurent.

Rendu chez lui, aux Trois-Rivières, l'automne de 1660, Radisson (page 172) prétend qu'il ne dit rien à personne de la région du nord du lac Supérieur et il donne ses raisons pour cela "My brother and I considered whether we should discover what we have seene or not; and because we had not a full and whole discovery, which was that we have not ben in the bay of the north, not knowing anything but by report of the wild Christinos, we would make no mention of it for feare that those wild men should tell us a fibbe. We would have

[1] Le bœuf, en langue siouse, se dit *Tatanga*. (Radisson, 227, 246).

[2] Le 25 février 1660, aux Trois-Rivières, "M. Desgroseliers", est parrain d'un Attikamègue baptisé par le père René Menard. Ce pouvait être Médard né en 1651, car on voit aux registres de la paroisse des enfants de huit à dix ans pris comme parrains et marraines.

made a discovery of it ourselves and have an assurance, before we should discover (disclosed) anything of it."

A Québec, néanmoins, il s'était ouvert aux pères jésuites sur la question de l'ouest, du sud et du Mississipi. On a vu plus haut ce que le *Journal des Jésuites* en dit. Dans la *Relation* de cette année 1660, p. 27, le père Jérôme Lalemant donne d'autres détails qu'ils est bon de remarquer: "Une grande nation de quarante bourgs nommée Nadouechio8ec nous attend depuis l'alliance qu'elle a faite tout fraîchement avec les deux Français qui en sont revenus cet été. De ce qu'ils ont retenu de cette langue, nous jugeons assez qu'elle a la même économis que l'algonquine, quoiqu'elle soit différente en plusieurs mots. Au couchant, tirant vers le nord, les Poualacs et autres nations aussi nombreuses que les précédentes, ou peu s'en faut, n'ont pas moins d'affection qu'elles à nous recevoir, et y sont tout à fait portées depuis la ligue offensive et défensive qu'elles ont faite ensemble contre l'ennemi commun."

La même *Relation*, p. 9, est très précise: "Le lac que nous appelons Supérieur, à cause que étant au-dessus de celui des Hurons, il s'y décharge par un saut qui lui a aussi donné son nom . . . . porte plus de quatre-vingt lieues de long sur quarante de large en certains endroits . . . . Son rivage est bordé tout alentour de nations Algonquines, où la crainte des Iroquois leur a fait chercher un asile. Il est aussi enrichi dans tous ses bordages de mines de plomb presque tout formé, de cuivre si excellent qu'il se trouve tout raffiné en morceaux gros comme le poing . . . . Les Sauvages qui habitent la pointe de ce lac[1] la plus éloignée de nous ont donné les lumières toutes fraîches et qui ne déplairont pas aux curieux, touchant le chemin du Japon et de la Chine dont on a fait tant de recherche. Nous apprenons de ces peuples qu'ils trouvent la mer de trois côtés: au sud, du côté du couchant et du côté du nord . . . . De ce même lac Supérieur, en suivant une rivière vers le nord, on arrive, après huit ou dix journées, à la baie d'Hudson . . . . Le lac des Ouinipegouek n'est proprement qu'une grande baie (la baie Verte) de celui des Hurons; d'autres l'appellent le lac des Puants, non qu'il soit salé comme l'eau de mer, que les Sauvages appellent ouinipeg, c'est-à-dire eau puante, mais parce qu'il est environné de terres ensouffrées, d'où sortent quelques sources qui portent dans ce lac la malignité que leurs eaux ont contractées aux lieux de leur naissance."

Le père Jérôme Lalemant, parti de Québec en juillet 1660, se trouvait à trente lieues dans le Saguenay lorsqu'il rencontra un sauvage nommé A8atanik qui venait d'arriver avec sa femme, après un voyage de

[1] Les Outaouas et autres, de Chagouamigon.

deux ans commencé à la baie Verte, continué le long du lac Supérieur, ensuite à la baie d'Hudson, puis au Saguenay. Il recueillit de sa bouche plusieurs renseignements sur les peuples de ces contrées (*Relations,* 1660, pp. 9-12).

Il ajoute à ce récit d'autres observations: "A peine me fus-je rendu à Québec que j'y trouvai deux Français (Chouart et Radisson) qui ne faisaient que d'arriver de ces pays supérieurs, avec trois cents Algonquins dans soixante canots chargés de pelleteries. Voici ce qu'ils ont vu de leurs propre yeux: ils ont hiverné sur les rivages du lac Supérieur et ont été assez heureux pour y baptiser 200 petits enfants de la nation Algonquine, avec laquelle ils ont premièrement demeuré. Ces enfants étaient attaqués de maladie et de famine; quarante sont allés droit au ciel, étant morts peu après le baptême. Nos deux Français firent, pendant leur hivernement [1] diverses courses vers les peuples circonvoisins. Ils virent, entre autres choses, à six journées au delà du lac, vers le sud-ouest, une peuplade composée des restes des Hurons de la nation du Pétun,[2] contraints par l'Iroquois (en 1650) d'abandonner leur patrie.... ces pauvres gens s'enfuyant et faisant chemin par des montagnes et sur des rochers, au travers de ces grands bois inconnus, firent heureusement rencontre d'une belle rivière, grande, large, profonde (le Mississipi) et comparable, disent-ils, à notre grand fleuve du St-Laurent. Ils trouvèrent sur ses rives la grande nation des Alini8ek (Illinois) qui les reçut très bien. Cette nation est composée de soixante bourgades, qui nous confirme dans la connaissance que nous avions déjà de plusieurs milliers de peuples qui remplissent toutes ces terres du couchant. Nos deux Français continuant leur ronde furent bien surpris en visitant les Nadsechisec, (Sioux) ils virent des femmes défigurées et à qui on avait coupé le bout du nez jusqu'au cartilage, de sorte qu'elles paraissaient en cette partie du visage comme des têtes de mort [3] . . . . Ils ont visité les quarante bourgs dont cette nation est composée, dans cinq desquels on compte jusqu'à cinq mille hommes..... Il y a une autre nation belliqueuse qui, avec ses flèches et ses arcs, s'est rendue aussi redoutable parmi les Algonquins supérieurs que l'Iroquois l'est parmi les inférieurs, aussi en porte-t-elle le nom de P8alak, c'est-à-dire les guerriers. Comme le bois est rare et petit chez eux, la nature leur a appris à faire

[1] Hiver de 1659-60, chez les Sioux.

[2] Aux sources de la rivière Noire. Ce texte du Père Lalemant donne à croire que la visite en question eut lieu durant l'hiver de 1659-60—et non pas l'automne de 1659 comme nous le pensions.

[3] Dès 1622 Etienne Brulé disait avoir vu, au lac Supérieur, des femmes dont le nez avait été coupé en punition de leur mauvaise conduite. (Sagard: *Grand Voyage au Pays des Hurons.*)

du feu avec du charbon de terre[2] et à couvrir leur cabanes avec des peaux."

Charlevoix, écrivant beaucoup plus tard, s'exprime comme ceci: "Deux Français, après avoir hiverné sur les bords du lac Supérieur, avec un grand nombre de familles algonquines, eurent la curiosité de pénétrer plus avant dans l'ouest, et allèrent jusqu'aux Sioux." La révélation d'un grand fleuve, pourtant consignée dans la *Relation* de 1660, lui échappe. Le R. P. Tailhan dit à ce propos: "Il se pourrait que, dans le Mississipi naissant et déguisé sous un nom sioux, nos deux voyageurs n'aient pas reconnu le fleuve large et puissant que les Hurons leur désignaient sous son nom algonquin. Dans ce cas, ils auraient, mais à leur insu, revu les premiers au XVIIe siècle, le Mississipi découvert au XVIe par Ferdinand de Soto." (Perrot, p. 238).

Radisson avait très bien vu l'été de 1659, à la sortie du Wisconsin, "le fleuve large et puissant," dont il retrouva les sources quelques mois plus tard, durant l'hiver, au pays des Sioux. C'est le même que la Mère de l'Incarnation mentionnait en 1654 et c'est le fleuve "comparable à notre Saint-Laurent" que Radisson décrit en 1660 au père Jérôme Lalemant.

[2] En 1730, la Vérendrye disait que ces sauvages se chauffaient avec des roches.

II.—*Un épisode de l'histoire de la dîme au Canada (1705-1707).*

Par M. l'abbé AUGUSTE GOSSELIN, docteur ès lettres.

(Lu le 20 mai 1903.)

Je n'ai nullement l'intention de faire ici l'histoire complète de la dîme, ce qui serait long et fastidieux, mais seulement d'en raconter un épisode assez curieux, dont les détails, je crois, sont généralement peu connus.

Il s'agit du procès des curés Boulard et DuFournel, au Conseil Supérieur de Québec, fin de 1705 et commencement de 1706, des causes, des circonstances et des suites de ce procès.

Comme préface de l'épisode, il convient, cependant, de rappeler en quelques mots les différentes phases qu'avait traversées auparavant la question de la dîme.

* * *

L'institution de la dîme remonte à l'année 1663. Jusque-là, les missionnaires qui desservaient le pays avaient été entretenus aux frais des Compagnies qui jouissaient du privilège de la traite des pelleteries, et par les dons volontaires des fidèles.

Le premier évêque de Québec, Mgr de Laval, ayant érigé, au mois de mars 1663, le séminaire de cette ville, et lui ayant attribué les dîmes qui pourraient être établies par le roi, Louis XIV confirme cette érection, au mois d'avril suivant, et ordonne "que toutes les dîmes, de quelque nature qu'elles puissent être, tant de ce qui naît par le travail des hommes, que de ce que la terre produit d'elle-même, se paieront de treize une, et seront affectées à l'entretien du dit séminaire," alors chargé de toutes les missions canadiennes. Il ajoute que le séminaire jouira "de la totalité des dîmes, grosses et menues, anciennes et nouvelles, de tous les fruits généralement quelconques, et sans aucune distinction, qui proviendront sur toutes les terres de la Nouvelle-France." [1]

Cette loi ne fut pas sans susciter de vives protestations. On sait l'opposition que lui fit entr'autres le gouverneur Mésy.[2] Les termes de la loi prêtaient, d'ailleurs, aux malentendus. Mgr de Laval dut expliquer que par le mot "travail des hommes" on n'avait voulu dire rien autre chose que "le labourage des terres," et qu'il ne s'agissait

[1] *Edits et Ordonnances*, t. I, p. 35.

[2] *Vie de Mgr de Laval*, t. I, p. 297.

nullement d'exiger "la dîme des œufs, des choux, des planches, des cordes de bois," comme on en avait fait courir le bruit.[1]

Ce ne fut que dans l'automne de 1667 que la dîme commença à se payer régulièrement, et cela, grâce à un compromis établi par MM. de Tracy, Courcelles et Talon, de concert avec Mgr de Laval et les principaux habitants du pays.[2] D'après ce compromis, la dîme était réduite du treizième au vingt-sixième; mais les habitants étaient obligés de la payer en grain battu et bien vanné, rendu au presbytère: avant le règlement, les curés étaient obligés d'aller chercher leur treizième gerbe sur le champ. Le nouveau règlement était pour vingt ans, sans préjudice au droit du clergé à la dîme au treizième, le terme expiré.

Douze ans plus tard, le roi confirma l'institution de la dîme et le règlement de MM. de Tracy, Courcelles et Talon par son édit du mois de mai 1679 "concernant les dîmes et cures fixes."[3] D'après cet édit, la dîme devait se payer aux curés d'office eux-mêmes, et non plus au séminaire de Québec.

L'année suivante, à la demande d'un certain nombre de curés, M. de Francheville,[4] entre autres, qui ne voulaient pas s'embarrasser du soin de recevoir et de vendre leurs dîmes, sous prétexte "qu'ils étaient trop occupés à leurs fonctions spirituelles," le Conseil Supérieur ordonna qu'elles seraient affermées, et que si l'on ne trouvait pas d'enchérisseurs, il serait nommé une ou deux personnes pour les recevoir et en rendre compte aux curés.[5]

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Il était entendu que la portion congrue de chaque curé devait être d'au moins 500 livres.[6] Si la dîme n'était pas suffisante pour former

[1] *Mandements des évêques de Québec*, t. 1, p. 161.

[2] *Jugements du Conseil Supérieur*, t. V, p. 184.

[3] *Edits et Ordonnances*, t. I, p. 231.

[4] Prêtre canadien, né aux Trois-Rivières le 14 juillet 1649, fils de Marin de Repentigny, sieur de Francheville, originaire de Grandmesnil, en Normandie. M. de Francheville avait été ordonné prêtre le 19 septembre 1676. Mgr de Laval écrivait à son sujet en 1691: "On l'a élevé tout petit au séminaire. Il y a bien quatorze ou quinze ans qu'il est prêtre, ayant assez de vivacité d'esprit et d'aptitude pour les affaires. Je le fis promoteur (de l'officialité), et depuis ce temps nous l'avons envoyé en divers endroits administrer des missions ou cures. Il a été, entre autres, curé sept ans à l'île d'Orléans, où il était encore lorsque je me suis démis: il administrait deux paroisses, Saint-Pierre et Saint-Paul, assez proches l'une de l'autre... C'est un sujet qu'il a toujours été nécessaire de maintenir dans un esprit d'humilité, ayant de son naturel beaucoup de disposition à s'en faire accroire...." (Lettre de Mgr de Laval à M. de Brisacier, 17 avril 1691.)

[5] *Jugements du Conseil Supérieur*, t. II, p. 450.

[6] La livre, à cette époque, valait environ trois francs. La portion congrue était donc d'environ trois cents piastres.

ce montant, on y ajoutait un supplément qui devait être réglé par le Conseil, et payé par le seigneur et les habitants de la paroisse. Le plan n'était ni pratique, ni d'exécution facile. Aussi le roi finit-il par allouer une somme de 8,000 livres, à prendre sur le revenu public du pays, pour compléter, au besoin, les portions congrues des curés; et l'intendant, chaque année, rendait compte à la cour de la distribution des suppléments. M. de Champigny écrit au ministre le 24 octobre 1694:

"Je vous envoie l'état de l'emploi qui a été fait des 8,000 livres accordées par Sa Majesté pour partie de l'entretien et subsistance des curés. Sa Majesté doit être satisfaite de la conduite de M. l'Evêque (Saint-Vallier), qui a pris soin d'augmenter le nombre des curés, afin de donner des secours spirituels à de pauvres peuples éloignés, qui n'en avaient que fort rarement, et d'établir des cures fixes en beaucoup d'endroits." [1]

Tout alla bien durant quelques années; mais le roi, qui n'avait jamais assez d'argent pour ses guerres, menaça bientôt de retrancher les 8,000 livres, et d'abandonner le clergé aux seules ressources de la dîme. L'intendant, de son côté, ne manquait pas de lui faire à ce sujet de sérieuses représentations. Il écrit au ministre en 1697:

"A l'égard des 8,000 livres que Sa Majesté accorde pour l'entretien des curés, il me paraît qu'il est d'une grande nécessité de continuer cette gratification, si l'on ne veut pas priver quantité de paroisses, où il y a très peu de dîmes, de secours spirituels." [2]

Il ajoute l'année suivante:

"Il ne faut pas espérer que les curés puissent sitôt subsister sans le supplément des 8,000 livres, à cause de la pauvreté de la plus grande partie des paroisses." [3]

M. de Callières se joint à lui, en 1699, pour soutenir ses prétentions:

"Nous ne voyons aucune apparence de pouvoir sitôt retrancher les 8,000 livres que le roi a la bonté d'accorder pour partie de la subsistance et entretien des curés, car il y en a très peu qui puissent s'en passer." [4]

"Le bien que fait Sa Majesté, ajoute-t-on l'année suivante, de donner 8,000 livres pour partie de l'entretien des curés, est si nécessaire, que, s'il ne se faisait pas, il y aurait impossibilité absolue d'entretenir plus de huit ou neuf curés, tous les autres ne subsistant presque que par ce supplément, les dîmes n'étant pas encore considérables.

[1] Archives de la Marine, Canada, Correspondance générale, vol. 13.

[2] *Ibid.*, vol. 15.

[3] *Ibid.*, vol. 16.

[4] *Ibid.*, vol. 17.

Ainsi nous ne saurions nous dispenser de La supplier de continuer cette grâce si utile à la religion."[1]

Le nombre des paroisses augmentait, et cependant la somme allouée pour les suppléments restait toujours la même: beaucoup de curés n'avaient de supplément que tous les deux ans.

Enfin, vers 1704, l'allocation ayant été complètement retranchée, les curés, qui n'avaient plus de quoi vivre dans leurs missions, s'en allaient. MM. de Vaudreuil et Beauharnais écrivent au ministre le 19 octobre 1705:

"Les curés, n'ayant point leur supplément, abandonnent leurs paroisses."[2]

Voilà quelle était, d'après les documents officiels, la situation du clergé canadien à cette époque.

Mgr de Saint-Vallier, alors absent en Europe, travaillait à faire remettre la dîme au treizième, suivant son institution première. Mais il avait peu de chances de réussir; et d'ailleurs, dans l'opinion d'un bon nombre de gens désintéressés, la chose n'était pas désirable:

"M. l'Evêque de Québec n'entend pas les intérêts de son clergé, en demandant que la dîme soit mise au treizième comme en France", écrivait l'intendant Beauharnais.[3]

Que faire ? Il fallait bien pourtant que le clergé songeât à se procurer une honnête subsistance.

Le pays était dans une période de transition. Jusque-là, on avait négligé la culture de la terre et l'industrie; il y avait un retour vers un meilleur état de choses. L'intendant Raudot écrit au ministre en 1706:

"La colonie du Canada, après avoir coûté de grosses sommes à Sa Majesté, est d'une très petite utilité. Cela est provenu du libertinage des habitants et du gros prix que valait le castor. Les habitants de ce pays commencent à présent à reconnaître l'erreur de tout ce qu'ils ont fait. Ils s'adonnent à la culture de leurs terres, à faire des chanvres et des lins, et, étant encouragés, ils feront, à la fin, de ce pays un pays utile à la France.[4]

Un pays utile à la France ! Voilà bien ce que devait être le Canada dans la pensée de ces fonctionnaires: un instrument pour faire la fortune de la mère-patrie ! Les Français, d'abord, les Canadiens ensuite ! La France soutire toutes les pelleteries du pays; et aux Canadiens qui, pour les lui procurer, négligent leurs terres, courent les bois, s'amusent à faire la traite, elle impose ses denrées, ses draps, ses produits.

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[1] *Ibid.*, vol. 18.
[2] *Ibid.*, vol. 22.
[3] *Ibid.*, vol. 22.
[4] *Ibid.*, vol. 24.

On venait d'apporter quelque tempérament à ce régime, et cela était réputé une grande faveur:

" C'est une augmentation d'obligation que ce pays-ci vous a, écrit au ministre l'intendant Raudot, que la permission que vous donnez aux pauvres gens de faire de la toile et quelques mauvaises étoffes pour se couvrir. S'ils n'en avaient pas fait un peu, la moitié des habitants seraient sans chemises. Ils ont tous besoin d'en faire, car l'on peut dire que dans ce pays-ci il n'y a personne de riche et à qui tout ne soit nécessaire pour pouvoir subsister."[1]

Vraiment, si l'on ne connaissait la gravité de l'intendant Raudot, on serait tenté de croire qu'il y avait un peu d'ironie dans sa lettre.

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Quoi qu'il en soit, les curés canadiens jugèrent qu'ils devaient, eux aussi, bénéficier du mouvement industriel qui commençait; et interprétant à leur avantage les termes de l'édit royal pour l'établissement de la dîme, ils décidèrent qu'il fallait réclamer " toutes les dîmes, de quelque nature qu'elles puissent être, tant de ce qui naît par le travail des hommes, que de ce que la terre produit d'elle-même.. .. , la totalité des dîmes, grosses et menues, anciennes et nouvelles, de tous les fruits généralement quelconques, et sans aucune distinction, qui provenaient sur toutes les terres de la Nouvelle-France." Ils prétendaient avoir droit, par conséquent, à la dîme du lin, du chanvre, de la laine des moutons, des jardinages, des foins de grève et de prairies, etc.

Ces prétentions étaient d'autant plus graves qu'elles paraissaient contraires, au moins en partie, aux explications que Mgr de Laval avait données touchant la dîme, lors de son institution.[2]

Qui osera, le premier, les formuler en public ?

M. Boulard, curé de Beauport, s'en chargea, avec le concours de son voisin, le curé de l'Ange-Gardien, M. DuFournel. C'étaient deux prêtres d'un désintéressement reconnu, et que l'on ne pouvait, par conséquent, soupçonner d'agir pour des motifs sordides.

Le premier était théologal du chapitre, et appartenait au séminaire, dont il fut plus tard supérieur. Il devint aussi curé de Québec, et après la mort de Mgr de Saint-Vallier, gouverna le diocèse en qualité de vicaire capitulaire. M. DuFournel desservit l'Ange-Gardien durant plus d'un demi-siècle, et y mourut en 1757 à l'âge de 94 ans.

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[1] *Ibid.*, vol. 24.

[2] *Mandements des Evêques de Québec*, t. I, p. 161.

Tous deux s'entendirent, dans l'automne de 1705, pour rappeler fortement à leurs fidèles, au prône de leurs paroisses, la loi de la dîme; puis le dimanche 15 novembre, ils annoncèrent qu'à l'avenir ils exigeraient la dîme de tous les produits de la terre, du lin, du chanvre, du tabac, des jardinages, des foins de prairies, etc.

S'attendaient-ils de faire admettre de suite leurs prétentions ? La chose n'est guère probable; mais ils voulaient remuer un peu l'opinion publique, faire soumettre leurs prétentions aux tribunaux, et établir ce que nous appellerions aujourd'hui un *test case.*

Le but qu'ils avaient en vue fut atteint. Leur prône fit sensation; on ne parlait que de cela au sortir de l'église: les commentaires ne tarissaient pas. A Beauport, surtout, où le seigneur Juchereau du Chesnay[1] faisait le beau et le mauvais temps, ces commentaires étaient particulièrement désobligeants pour le clergé.

Juchereau se trouvait justement à cette époque en guerre avec les Jésuites au sujet des limites de leurs seigneuries respectives;[2] il était évidemment peu d'humeur à tolérer les empiètements des ecclésiastiques. Dès le mardi suivant il montait à Québec chez son beau-frère, le procureur-général D'Auteuil,[3] et lui faisait part de ce qui s'était passé à Beauport et à l'Ange-Gardien le dimanche précédent. Il fut convenu qu'il n'y avait pas une minute à perdre et qu'il fallait immédiatement référer au Conseil Supérieur les prétentions des curés Boulard et DuFournel au sujet de la dîme.

Mais comment faire ? Le Conseil avait pris ses vacances le 12 octobre, "afin de permettre à chacun de faire sa correspondance pour la France avant le départ des derniers vaisseaux;" il n'était rentré aux affaires que la veille, savoir, "le premier lundi d'après la Saint-Martin," et avait eu sa séance ordinaire.[4] D'Auteuil n'hésita pas, vu la gravité des circonstances, à le convoquer extraordinairement pour le lendemain, mercredi, 18 novembre. Il n'avait que l'après-midi du 17 pour préparer sa charge contre les curés Boulard et DuFournel; mais il devait suppléer par son ardeur à la brièveté du temps; l'intérêt de la cause doublait son énergie.

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[1] Ignace Juchereau, fils de Nicolas Juchereau et de Marie-Thérèse Giffard. Il avait la seigneurie de son grand'père, Robert Giffard.

[2] L'ancienne ferme des Jésuites, dite de Saint-Ignace, à Beauport, appartient aujourd'hui au Séminaire de Québec.

[3] D'Auteuil avait épousé en 1683 Marie-Anne Juchereau, veuve de François Pollet de la Combe.

[4] *Jugements du Conseil Supérieur,* t. V, p. 167.

François-Madeleine Rüette D'Auteuil, procureur-général du Conseil Supérieur, était fils de Denis-Joseph, qui était venu au Canada en 1651[1] et avait été nommé conseiller au Conseil Supérieur par M. de Mésy et Mgr de Laval, lors de la création de cette cour souveraine en 1663.

Denis-Joseph D'Auteuil était tout dévoué au clergé, et spécialement aux jésuites. Il n'en fallait pas davantage pour qu'il fût peu goûté de Frontenac; et l'on sait que celui-ci l'obligea un jour à s'absenter du Conseil[2] et à se retirer sur ses terres de Monceaux,[3] à Sillery. L'attachement que Denis-Joseph D'Auteuil professait pour les jésuites, faisait dire à Frontenac: "Il est comme leur frère donné;" et il ajoutait: "Il vaudrait autant avoir mis dans le Conseil le Père supérieur des jésuites et le Père ministre que les sieurs de Villeray et D'Auteuil."[4]

Cela n'empêcha pas la cour de confier à D'Auteuil, en 1675, les fonctions importantes de procureur-général; et il les remplit à la grande satisfaction de toute la colonie.

Malheureusement il avait peu de santé; et dès l'année suivante l'intendant DuChesneau le voyant "fort incommodé de la poitrine et d'une fluxion sur les yeux, et appréhendant qu'il en mourût, ou qu'il tombât dans un état qu'il ne pourrait plus exercer sa charge," s'adressa à Colbert, et lui demanda de vouloir bien lui envoyer des lettres de provisions pour un substitut du procureur-général, laissant en blanc la place du nom, avec permission de la remplir, en cas de nécessité: ce qui lui fut accordé.[5]

De son côté, Denis-Joseph D'Auteuil, lorsqu'il avait accepté la charge de procureur-général, avait supplié le roi de vouloir bien en réserver la survivance à son fils.

Il continua à exercer ses fonctions jusqu'à sa mort, arrivée le 27 novembre 1679; et c'est alors que DuChesneau se servant des lettres de provision que lui avait expédiées Colbert, alla trouver Frontenac, et lui demanda s'il ne trouvait pas à propos que l'on remplît le blanc avec le nom du fils de D'Auteuil, François-Madeleine. Le jeune homme n'avait pas "l'âge compétent pour exercer la charge de substitut, n'ayant pas encore vingt-deux ans." "Mais, disait DuChesneau, il travaille sous son père depuis deux ans, et il est le seul dans le pays à

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[1] *Journal des Jésuites*, p. 160.

[2] *Vie de Mgr de Laval*, t. II, p. 165.

[3] Ainsi appelées du nom de sa femme, Mlle de Monceaux, Claire-Françoise, fille de Jean du Clément du Vault, seigneur de Monceaux, et d'Anne Gasnier. Anne Gasnier épousa en 1655 le procureur-général Jean Bourdon.

[4] Manuscrits de la Nouvelle-France, 2e série, t. II, p. 69.

[5] *Jugements du Conseil Supérieur*, t. II, p. 341.

pourvoir de charge, qui ait fait son cours de droit, et qui soit reçu avocat en la cour du Parlement de Paris."[1]

Frontenac ne voulut jamais consentir à cette nomination. Le Conseil passa outre, et agréa que François-Madeleine D'Auteuil exerçât les fonctions de substitut du procureur-général, bien qu'il n'eût pas encore l'âge voulu.

La cour non seulement approuva cette nomination, mais l'année suivante nomma le jeune D'Auteuil "conseiller de Sa Majesté et son procureur-général en survivance de son père."

Le nouveau procureur-général ne pardonna jamais à Frontenac l'opposition qu'il en avait reçue en cette circonstance, et il le lui témoigna en combattant souvent ses opinions au Conseil: "La fermeté de M. D'Auteuil, écrit quelque part l'abbé Verreau, était presque de l'intrépidité."[2]

Mais il n'en était pas, pour cela, plus favorable au clergé: au contraire, en comparant sa conduite à l'égard des ecclésiastiques avec celle de son père, on aurait dit qu'il voulait soutenir la contre-partie. Il en voulait surtout aux jésuites, qu'il accusait, bien injustement, de faire le commerce des castors chez les sauvages outaouais;[3] et les difficultés que ces religieux avaient avec son beau-frère, le seigneur de Beauport, n'étaient pas de nature à dissiper ses préjugés.

* * *

Il arriva à la séance du Conseil du 18 novembre 1705, armé de pied en cap contre les curés Boulard et DuFournel, et animé d'un zèle d'autant plus ardent pour la défense des intérêts populaires, que lui et ses proches avaient dans le pays de grandes propriétés foncières qu'il fallait protéger contre les envahissements de la dîme.[4]

Etaient présents à la séance le gouverneur M. de Vaudreuil, les intendants Raudot, père et fils, et les Conseillers de Lotbinière, Dupont, de Lino et Hazeur.

Refaisons le discours du procureur-général, d'après le compte-rendu de la séance, tel qu'il se trouve aux archives du Conseil Supérieur:[5]

"J'ai eu avis hier, dit-il, que le curé de la paroisse de l'Ange-Gardien, en la seigneurie de Beaupré, et celui de Notre-Dame de Beau-

[1] *Ibid.*, p. 342.

[2] *Quelques notes sur Antoine de Lamotte de Cadillac.*

[3] Archives de la Marine, Canada, Correspondance générale, vol. 22.

[4] Il avait, entre autres propriétés, un fief d'une demi-lieue de front sur le fleuve, entre le fief des Aulnets et celui de Port-Joly. (*Edits et Ordonnances*, t. I, p. 449.)

[5] *Jugements du Conseil Supérieur*, t. V, p. 184.

port ont, dans leurs prônes, dimanche dernier et autres dimanches précédents, averti leurs paroissiens que dorénavant ils prétendaient qu'on leur payât la dîme non seulement des grains, comme il a été pratiqué jusqu'à présent, mais encore de tout ce que la terre produit par la culture, ou sans culture, et des bestiaux, la dîme par conséquent des foins de bas prés, fruits, lin, chanvres, moutons et autres choses.

"Ces propositions, ajoute-t-il, ont causé un grand murmure parmi les habitants, à la sortie de la messe, à cause de la nouveauté de la chose, nouveauté insupportable en ce pays, qui est déjà si difficile par la rigueur de son climat.

"Les habitants sont à peine capables de payer exactement la dîme de leurs grains et de subvenir à leurs pressants besoins. Ils sont convaincus qu'ils ne peuvent subsister à l'avenir, qu'en s'appliquant à élever des moutons, et à cultiver le lin et le chanvre. Depuis deux ans qu'ils se sont mis à le faire, ils commencent à en ressentir les heureux résultats. Mais les prétentions et les exigences de leurs curés sont capables de les décourager, et même de les rebuter pour jamais."

D'Auteuil rappelle ensuite le règlement des dîmes, du 4 septembre 1667, établi par MM. de Tracy, Courcelles et Talon, "de concert avec M. de Laval, et après avoir entendu les plus notables du pays:"

"Par ce règlement, dit-il, il fut arrêté que les dîmes ne se paieraient à l'avenir que des grains seulement, et à raison du vingt-sixième minot.. .. Ce règlement resta au secrétariat de l'intendant Talon; et quoiqu'il ne paraisse pas, parce que la plus grande partie de ce secrétariat a été dissipée, comme la plupart de ceux de ses successeurs, il a été exécuté de bonne foi de part et d'autre; et il ne peut être nié, parce qu'il y a encore des personnes vivantes qui en ont eu parfaite connaissance, pour y avoir été appelées."

Le procureur-général rappelle encore l'édit de 1679; puis il ajoute:

"Lorsque Sa Majesté fit connaître ses intentions à M. le comte de Frontenac et à l'intendant DuChesneau au sujet de l'établissement des cures fixes en ce pays, ils eurent ordre de régler dans une assemblée à quelle somme serait fixée la portion congrue de chaque curé; et elle le fut à 500 livres, outre les menus profits du dedans de l'église: et on estime qu'avec cette somme, outre leur subsistance et entretien, ils pourraient avoir un domestique pour les servir.. ..

"Il est incontestable que par le partage qui a été fait pour l'étendue de chaque cure ou mission, il y a peu de curés qui n'aient plus que la portion congrue, par les dîmes de grains seulement, comme elles se sont perçues jusqu'à présent. Et si l'on voulait y faire quelque changement, ce ne serait que pour donner du superflu aux curés, à la charge des peuples.

"Les prônes des curés Boulard et DuFournel sont une entreprise contre l'autorité séculière: il est important d'en empêcher la continuation, ainsi que les inconvénients qui en pourraient résulter."

D'Auteuil concluait en priant le Conseil d'obliger les curés de Beauport et de l'Ange-Gardien à venir "rendre compte de quelle autorité ils avaient fait ces publications," et de leur défendre, ainsi qu'à tous autres curés, "de rien innover par rapport au paiement des dîmes." Il priait également le Conseil "de défendre à tous les habitants de payer d'autres dîmes que celles des blés et de toutes sortes de grains, comme on avait toujours fait par le passé."

Le Conseil donna raison au procureur-général sur toute la ligne, et rendit un arrêt obligeant les curés Boulard et DuFournel à venir rendre compte de leur conduite, et leur défendant de rien innover dans la perception des dîmes. Cet arrêt leur fut signifié le 11 décembre.[1] Ils préparèrent immédiatement leurs mémoires et vinrent eux-mêmes les présenter au Conseil le 22 décembre suivant. Ces mémoires furent communiqués au procureur-général, et le Conseil remit "au premier jour d'après les Rois" à rendre sa décision.

Voici ce que contenaient en substance les mémoires de MM. Boulard et DuFournel: "Se croyant obligés d'expliquer aux fidèles les commandements de Dieu et de l'Eglise, ils avaient pris de là occasion de leur rappeler la loi des dîmes. Si dans le passé le clergé n'a pas réclamé toutes les natures de dîmes, ce n'a été que pour condescendre à la misère des temps. Lorsqu'on estima à 500 livres la partie congrue des curés, il s'agissait de ceux qui se mettaient en pension; mais il était entendu que ceux qui tenaient maison avaient besoin de 300 livres de plus pour un valet. D'ailleurs, dans les 500 livres on comptait 300 livres pour la nourriture, et 200 livres pour l'entretien: or le linge, les étoffes et le vin sont aujourd'hui à un prix excessif; la dîme sur les grains ne peut suffire pour la partie congrue. Les habitants ne trouvant pas la culture des grains assez payante, ont laissé leurs terres en prairies; d'autres y sèment du chanvre et du lin; et tout cela prend la place du grain. Il y a des vergers de quarante arpents, que les propriétaires prétendent exempter de la dîme. Les arrêts de France ont jugé que la terre labourable étant convertie en vignes, oignons, raves, etc., les dîmes devaient s'y percevoir.. .."

D'Auteuil répondit à ces mémoires à la séance du Conseil du 10 janvier 1706:

"Les dîmes doivent se payer suivant l'usage, au lieu que les curés Boulard et DuFournel les exigent comme les provinces de France les paient toutes ensemble. Un curé qui a 500 livres, avec les profits du

[1] *Edits et Ordonnances*, t. I, p. 309.

dedans de l'église, a honnêtement de quoi vivre. Tous les vergers réunis, depuis Tadoussac jusqu'à Montréal, nord et sud, c'est-à-dire sur une étendue de cent quatre vingt lieues, ne contiendraient pas quarante arpents ensemble: la plainte des curés à cet égard est donc sans fondement. Il est vrai que les grains sont quelquefois à bas prix, mais alors l'abondance est une compensation. On donnerait volontiers à chaque curé 600 livres et plus pour ses dîmes de grains: ainsi la nouveauté qu'ils veulent introduire n'est que pour se donner du superflu."

Il concluait à ce qu'il n'y eût aucune innovation dans la perception des dîmes, "sauf aux curés, disait-il, qui n'auront pas un revenu suffisant, à se pourvoir pour le supplément conformément à l'édit de 1679."

Le sort des curés Boulard et DuFournel était d'ores et déjà décidé: leurs juges étaient tous de grands propriétaires, comme le procureur-général lui-même, et intéressés comme lui à ce qu'il n'y eût aucun changement dans le paiement des dîmes. L'arrêt du Conseil, rendu le 1er février 1706, se lit comme suit:

"Le Conseil a ordonné et ordonne que les dîmes seront levées et payées par les habitants aux sieurs Boulard, DuFournel et autres curés de ce pays, conformément à l'usage qui a été observé jusqu'à présent, et fait défense à tous curés de les demander, et aux habitants de ce pays de les payer autrement, jusqu'à ce que par le roi en ait été ordonné."

* * *

Il y avait appel au roi de cette décision: le clergé canadien en profita. Dans sa requête, il renchérissait sur les prétentions des curés Boulard et DuFournel, et demandait que la dîme fût mise au treizième, suivant son institution première. Voici en substance cette requête:

"Les soussignés, curés et missionnaires du Canada, persuadés de la protection de Sa Majesté pour l'Eglise de cette Nouvelle-France, et de son attention pour le soutien de ses privilèges, qu'Elle a toujours maintenus toutes les fois qu'on a voulu y donner atteinte, viennent avec confiance implorer l'autorité de Sa Majesté dans une affaire qui intéresse toute l'Eglise de ce pays, puisqu'il s'agit de la perception des dîmes, sans lesquelles elle ne peut subsister.

"Le Conseil de Québec leur en interdit la jouissance, jusqu'à ce que Sa Majesté ait déclaré derechef ses intentions, quoiqu'Elle les ait formellement expliquées par son édit du mois d'avril 1663: "Toutes les dîmes, y est-il dit, de quelque nature qu'elles puissent être, tant de ce qui naît en Canada par le travail des hommes, que de ce que la

terre produit d'elle-même, se paieront de treize portions une, et le clergé jouira de la totalité des dîmes, grosses et menues, anciennes et nouvelles, de tous les fruits généralement quelconques, et sans aucune distinction, qui proviendront de toutes les terres dans le pays de la Nouvelle-France."

"MM. de Tracy, Courcelles et Talon trouvèrent cela si nécessaire pour la subsistance des curés, qui d'ailleurs n'avaient aucun autre moyen pour vivre, qu'ils firent un règlement, en 1667, pour l'exécution de cet édit. Considérant l'état du pays, pour lors encore très peu défriché et habité, le climat fâcheux, les saisons inconstantes, et les chemins tout-à-fait impraticables, ils ordonnèrent que les dîmes se paieraient de tout ce qui naît par le travail des hommes, et de tout ce que la terre rapporte d'elle-même, par les habitants, pures et nettes, et seulement de la 26e portion une, au lieu de la 13e, et cela pendant l'espace de vingt années, et jusqu'à ce que le pays fût en état de souffrir une plus forte imposition.. ..

"Il ne peut faire aucun doute que les curés du Canada ne soient en droit de lever la dîme conformément aux édit et règlement ci-dessus, et avec d'autant plus de fondement que Sa Majesté n'a rien ordonné par ses édits que de conforme à plusieurs autres qu'Elle a rendus pour tout le Royaume, en conséquence desquels les curés ont droit de percevoir les dîmes de toutes choses, et particulièrement de tout ce qui provient d'une terre qui a une fois rapporté une chose qui doit dîme.. ..

"Si Sa Majesté permettait aux habitants de ne payer la dîme que des grains seulement, les curés seraient réduits à la mendicité, et se trouveraient hors d'état de desservir leurs cures, et même contraints de les abandonner,[1] attendu que le peu de débit de ces grains fait que ces habitants ensemencent la plus forte partie de leurs terres de différentes denrées, et particulièrement de celles qui se vendent le mieux.

"Les suppliants prient Sa Majesté de considérer que leur unique bien consiste dans la dîme, d'où il faut qu'ils tirent leur nourriture et leurs habillements, qu'ils sont contraints d'acheter à un prix excessif, et jusqu'aux moindres choses de la vie, pendant que toutes les denrées qui croissent dans le pays se donnent à un prix fort médiocre, faute de consommation, et qu'il serait juste qu'ils partageassent du moins avec les peuples qu'ils servent, les moyens de subsister dans ce que le pays peut produire.. ..

"La raison dont le Conseil de Québec s'est servi pour rendre son arrêt, c'est que les curés n'ont point prétendu jusqu'à présent per-

[1] C'est ce que quelques-uns avaient déjà fait, au témoignage du gouverneur et de l'intendant, comme nous l'avons vu plus haut.

cevoir la dîme de toutes les denrées, et qu'ainsi ils sont non recevables à demander aujourd'hui une chose à laquelle ils n'ont jamais songé. Mais dans les commencements, toutes choses, à part les grains, étaient de si peu de conséquence, qu'il ne valait pas la peine d'en demander la dîme: le lin, le chanvre, le tabac, les citrouilles et les autres denrées étaient encore inconnues, et les peuples étaient alors dans une si grande indigence qu'il était difficile à des missionnaires que la charité amenait au Canada, de ne pas relâcher de leurs droits. Aujourd'hui que ces habitants sont si bien établis, il est juste qu'ils se soumettent à leurs obligations.

"Un autre prétexte à la décision du Conseil, c'est la grande pauvreté des peuples. Mais il est de notoriété publique que communément il n'y a point d'habitants qui ne vivent sur leurs terres, en y prenant de la peine. Ils y trouvent presque toutes les nécessités de la vie, et même ordinairement assez abondamment. Ce sont les habillements qui leur coûtent le plus, et encore commencent-ils à recueillir du lin, dont ils font quantité de toile, et à élever des moutons dont ils prennent la laine pour faire des étoffes; au lieu que les suppliants sont obligés d'acheter jusqu'aux moindres choses, et hors d'état de secourir les pauvres.. .."

En terminant sa requête, le clergé canadien suppliait le roi d'ordonner "que tous les habitants du Canada possédant des terres seraient tenus de payer la dîme de treize portions une, savoir, de toutes sortes de grains, du lin, chanvre, tabac, citrouilles, fruits qui naissent sur les arbres, jardinages, foins, et généralement tout ce que la terre produit d'elle-même, et le tout sur le même pied."[1]

* * *

On ne peut douter que les missionnaires du Canada, en adressant cette requête à la cour, étaient en parfait accord avec leur évêque, Mgr de Saint-Vallier, qui, connaissant bien leurs besoins et leur dénuement, travaillait lui-même à faire mettre la dîme au 13e.[2] Malheureusement le prélat était alors détenu prisonnier en Angleterre; il ne devait revoir la France qu'en 1709, et son diocèse qu'en 1713.[3] Il ne pouvait donc guère s'occuper avec avantage de plaider la cause de son clergé auprès de la cour.

Mais le clergé canadien avait à Paris un représentant autorisé, dans la personne de M. de la Colombière, l'un des trois grands vicaires —les deux autres étaient MM. de Maizerets et Glandelet—qui gouver-

[1] *Edits et Ordonnances*, t. I, p. 305.

[2] Lettre de MM. de Vaudreuil et Beauharnais au ministre, Québec, 19 octobre 1705.

[3] Gosselin, *Le Vén. François de Montmorency-Laval*, p. 383.

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naient alors l'Eglise de Québec en l'absence de l'évêque. M. de la Colombière était passé en France en 1705, après le deuxième incendie du séminaire de Québec,[1] pour solliciter des secours en faveur de cette institution. Il y avait aussi M. de Brisacier, supérieur du séminaire des Missions-Etrangères, auquel le séminaire de Québec était alors affilié, qui portait un vif intérêt à l'Eglise du Canada. M. de Brisacier écrivait au ministre Pontchartrain le 4 avril 1707:

"Si M. D'Auteuil, procureur-général du Conseil de Québec, vous donne, monseigneur, quelques écrits contre l'Eglise et les curés du Canada, sur le fait des dîmes, ordonnez, je vous prie, qu'ils nous soient communiqués, afin que nous puissions vous donner nos réflexions avant que vous décidiez.. .. "[2]

D'Auteuil, en effet, se trouvait lui-même à Paris: il était passé en France dans l'automne de 1706, pour essayer de se justifier de très graves accusations qui pesaient sur lui par rapport à l'accomplissement de ses fonctions comme procureur-général. Il avait perdu la confiance du gouverneur et de l'intendant du Canada. Voici ce qu'écrivait à son sujet M. Raudot, fonctionnaire "plein de justice et d'équité," au témoignage de M. de Vaudreuil:[3]

"Quand même, disait l'intendant, le sieur D'Auteuil resterait ici (au Canada), je ne pourrais pas me servir de lui. Il a quelque capacité; mais vous verrez, monseigneur, par la lettre que je me donne l'honneur de vous écrire au sujet de l'affaire du sieur Berthelot contre la Dame de Laforêt, qu'il n'a pas la probité qui convient dans ces sortes d'affaires. . . . "[4]

Voilà l'adversaire contre lequel le clergé canadien allait avoir à défendre ses droits et ses prétentions, à la cour: un homme rusé, habile, très capable, mais "sans probité." Ce sont bien là les adversaires les plus dangereux.

D'Auteuil était appuyé dans ses prétentions par l'un des conseillers du Conseil Supérieur de Québec, François Aubert de la Chenaie,[5] seigneur de Mille-Vaches, qui, lui aussi, était passé en France dans l'automne de 1706.[6]

Le procureur-général dressa un long mémoire en réponse à la requête du clergé canadien. Voici en substance ce qu'il contenait:

"Le règlement du 4 septembre 1667, dont l'original n'existe pas, mais qui ne peut avoir été autre chose que ce qui s'est pratiqué depuis,

[1] Cet incendie eut lieu le 1er octobre 1705.

[2] Archives de la Marine, Canada, Correspondance générale, vol. 27.

[3] *Ibid.*, vol. 24.

[4] Lettre de l'intendant Raudot au ministre, Québec, 2 novembre 1706.

[5] La famille de la Chenaie était alliée aux Juchereau.

[6] *Jugements du Conseil Supérieur*, t. V, p. 440.

doit être la règle pour la perception des dîmes. Si elles ne sont pas suffisantes, le règlement de 1679 y a pourvu. Depuis l'arrêt du 23 décembre 1680,[1] les curés ont trouvé plus d'avantage à faire eux-mêmes la perception de leurs dîmes; et il y a eu des années où quelques-uns d'entre eux ont produit jusqu'à 1500 et 2000 livres, même plus. En percevant eux-mêmes leurs dîmes, ils ont ôté au public la connaissance de la vraie valeur des dîmes, et ont pris plus hardiment le prétexte d'obtenir de Sa Majesté un supplément de 8000 livres. Pour reprendre cette connaissance, il n'y a qu'à faire exécuter le dit arrêt du 23 décembre 1680;[2] et s'il se trouve que les dîmes ne soient pas suffisantes, les habitants fourniront le surplus sur le pied de 500 livres, que l'on a estimé devoir suffire pour leur portion congrue.

"Quant à la plainte que font les curés que la dîme n'est levée qu'au 26e, la charge de l'engranger et de la porter au presbytère est très considérable. D'ailleurs le défrichement des terres n'en peut pas porter une plus forte; et la dîme des marais desséchés ne devrait même se payer à l'avenir qu'au 50e.

"Si les terres où l'on a semé du blé se mettent depuis en chanvre ou en lin, les curés en sont récompensés, parce que tous les ans on défriche plus de terre pour la mettre en blé qu'on ne sème de chanvre et de lin où il y avait eu du blé.

"La volonté du Roi est que les curés aient ce qui leur est nécessaire, soit par les dîmes, soit par le supplément. Les seigneurs et les habitants veulent bien s'y conformer; mais les nouvelles dîmes que les curés veulent imposer sont sans nécessité, et ils ne les demandent que pour s'enrichir aux dépens des habitants. On doit donc les renvoyer à l'exécution de l'édit de 1679 et des arrêts du Conseil Supérieur rendus en conséquence, et leur défendre de rien innover, sous peine de grosse amende."[3]

On ne pouvait être plus captieux et plus habile. Rien, pour l'ordinaire, ne flatte davantage l'autorité que d'entendre dire que tout va à merveille, sous sa direction, qu'il n'y a rien à changer dans les édits et les règlements existants, que tout est pour le mieux dans le meilleur des mondes. Rien, en particulier, ne pouvait être plus agréable à Louis XIV que d'apprendre, de la bouche d'un fonctionnaire canadien, que le clergé de son pays n'avait plus besoin des 8,000 livres qui avaient été accordées durant quelques années pour les portions congrues. Quelle bonne et heureuse réponse à ceux qui pourraient

[1] *Ibid.*, t. II, p. 450.

[2] Par cet arrêt, les dîmes devaient être affermées au plus offrant et dernier enchérisseur, et le prix donné aux curés.

[3] *Edits et Ordonnances*, t. I, p. 310.

venir lui reprocher d'avoir retranché cette somme ! On se laisse d'ailleurs si facilement persuader que le clergé en a toujours assez, et même trop !

D'un autre côté, le clergé canadien avait peut-être mal choisi l'occasion de réclamer une augmentation de la dîme: le pays était réellement pauvre, ou plutôt, suivant l'expression de MM. de Vaudreuil et Raudot, "très gueux et très dûr" :

"L'on peut dire qu'il n'y a personne de riche ici, écrivaient à la cour ces hauts fonctionnaires; et tous ceux qui y ont été peuvent vous assurer que ceux qui l'habitent ont bien de la peine à y avoir la nourriture et le vêtement."[1]

Les missionnaires du Canada ne se contentaient pas de demander la dîme au 13e; ils réclamaient la dîme du lin, du chanvre, du tabac. Cela produisit une mauvaise impression: ils semblaient vouloir mettre des entraves et nuire à des industries naissantes, que l'on avait eu beaucoup de peine à établir.

On eut beau présenter à la cour des mémoires, bien motivés, en réponse à celui de D'Auteuil, l'arrêt du Conseil d'Etat fut contraire aux prétentions du clergé. Cet arrêt, rendu à Marly le 12 juillet 1707, se lit comme suit:

"Sa Majesté, étant en son Conseil, sans s'arrêter à la requête des curés et missionnaires du Canada, a ordonné et ordonne que les arrêts du Conseil Supérieur de Québec des 18 novembre 1705 et 1er février 1706 seront exécutés, sauf aux dits curés et missionnaires à se pourvoir pour le supplément nécessaire, en exécution de l'article 4 de l'édit du mois de mai 1679."

C'était laisser la dîme dans l'état où elle était depuis le règlement de 1667, et pour le supplément renvoyer le clergé devant le Conseil Supérieur lui-même.

Le clergé canadien avait perdu sa cause, en apparence: en réalité, il avait gagné un point important, la confirmation solide et définitive de la loi de la dîme; et cette loi, le peuple l'acceptait d'autant plus volontiers qu'elle avait été adoucie en sa faveur, et qu'il avait lui-même gagné son point contre les prétentions du clergé. On lit dans une dépêche de MM. de Vaudreuil et Raudot au ministre:

"Nous tiendrons exactement la main à l'exécution de l'arrêt que vous eûtes la bonté de nous envoyer l'année dernière au sujet des dîmes. Nous vous en remercions au nom de tous les habitants de ce pays, et vous supplions pour eux de vouloir bien toujours laisser les choses sur le même pied qu'elles sont. . . ."[2]

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[1] Lettre de MM. de Vaudreuil et Raudot, Québec, 14 novembre 1708.

[2] Archives de la Marine, Canada, Correspondance générale, vol. 28.

Le procureur-général D'Auteuil avait gagné sa cause contre le clergé canadien en général: il lui restait à faire faire la leçon au curé Boulard, en particulier, avec lequel lui et son beau-frère Juchereau devaient être passablement brouillés. La lettre suivante du ministre au "vicaire-général du Canada" fait voir que l'habile procureur-général réussit encore sur ce point:

"Dans le compte que j'ai rendu au Roi de l'affaire des dîmes qui se lèvent en Canada, écrit le ministre, je n'ai pu me dispenser d'informer Sa Majesté qu'un des curés de ce pays a eu l'imprudence d'ajouter aux commandements de l'Eglise un septième commandement pour le paiement des dîmes, et qu'il y a même fait la matière d'un prône.

"Sa Majesté m'a commandé de vous écrire que son intention est que vous fassiez une forte réprimande à ce curé pour avoir abusé de son ministère en cette occasion, et que vous l'avertissiez que si pareille chose lui arrivait encore, elle le ferait punir. Je vous prie de me faire savoir ce que vous ferez sur cela, afin que j'en rende compte à Sa Majesté."[1]

Voilà comment dans l'ancienne France, l'Etat s'immisçait dans les affaires religieuses, dans ce qui regardait, par exemple, la prédication et comment on traitait le clergé, à l'époque où le roi Très Chrétien se considérait vis-à-vis l'Eglise comme l'"évêque du dehors!"

Pour bien comprendre la lettre que nous venons de citer,[2] il faut se rappeler que la loi de la dîme existait alors en France comme au Canada: elle y était même généralement plus rigoureuse; et c'était là comme ici une loi ecclésiastique, en même temps qu'une loi civile. C'était un commandement de l'Eglise; seulement, ce commandement n'était pas formulé dans les catéchismes français; on ne le trouve, par exemple, ni dans le catéchisme de Bossuet, dont nous avons une édition sous les yeux,[3] ni dans le catéchisme de Sens, qui était autrefois en usage au Canada. Il n'y avait dans les catéchismes français que six commandements de l'Eglise.

M. Boulard, dans ses prônes sur la dîme, avait-il formulé le septième Commandement de l'Eglise, tel que nous le récitons aujourd'hui, tel qu'il se lit dans nos catéchismes?[4] C'est possible: mais alors, il

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[1] Documents de Paris, Collection Moreau St-Méry, vol. 7, Lettre du 6 juillet 1707.

[2] Elle n'a jamais été publiée encore, du moins à notre connaissance.

[3] *Catéchisme du diocèse de Meaux, par Messire Jacques-Bénigne Bossuet, évêque de Meaux, Conseiller du Roy en ses conseils, ci-devant Précepteur de Mgr le Dauphin, premier aumônier de Madame la Dauphine. A Paris, chez Sébastien Mabre-Cramoisy, Imprimeur du Roy, rue Saint-Jacques, aux Cigognes. M. dc. LXXXVII.*

[4] "Droits et dîmes tu paieras à l'Eglise fidèlement."

n'avait fait que donner une forme populaire à une loi déjà existante et reconnue de tout le monde. Mgr de Saint-Vallier, du reste, venait de la formuler lui-même, quoique en termes un peu différents,[1] dans le catéchisme qu'il avait publié à Paris en 1702,[2] et nous ne voyons pas que le Roi l'ait réprimandé à ce sujet.[3] Dans ce catéchisme il n'y a pas seulement sept commandements de l'Eglise, il y en a neuf: le huitième et le neuvième regardent les excommuniés.[4]

Mgr Briand fit publier, en 1777, une édition spéciale du Catéchisme de Sens pour son diocèse, et y fit quelques changements. Il y introduisit spécialement la formule du septième commandement de l'Eglise; et personne n'y trouva à redire, parce que cette formule n'était que l'expression d'une loi reconnue et entrée dans les mœurs.

* * *

D'Auteuil, dans ses mémoires, n'avait pas ménagé le clergé du Canada: il s'était montré injuste et perfide à son égard; et dans les dépêches qu'il adressait à la cour, comme procureur-général du Conseil, il n'était pas tendre pour les jésuites: on aurait dit qu'il affectait de se montrer aussi désobligeant pour eux, que son père leur avait été favorable. On lit, par exemple, dans une de ses lettres au ministre:

"Ils ont assez de biens-fonds en ce pays: dans tous les quartiers on voit des seigneuries qui leur appartiennent.. . . "

Il les accuse non seulement de tenir magasin ouvert à Québec, mais surtout de trafiquer le castor avec les sauvages Outaouais:

"Ils font le commerce aux Outaouais, dit-il, ou il se fait par leur moyen; c'est public, et tout le monde en murmure. On voit tous les ans les canots des jésuites revenir chargés de castors. Peut-on juger que ce soit d'autres qu'eux qui fassent ce commerce, pendant qu'il est défendu à tout le monde?"[5]

Le procureur-général avait le triste courage de chercher à discréditer les jésuites, alors que lui-même était sous le poids de très graves accusations. Nous avons vu qu'il était passé en France pour essayer de se justifier. Il ne put réussir. L'intendant Raudot n'avait pas

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[1] "Hors les temps Noces ne feras: paie la dîme justement."

[2] *Catéchisme du diocèse de Québec, par Monseigneur l'Illustrissime et Révérendissime Jean de la Croix de Saint-Vallier, Evêque de Québec, en faveur des curés et des fidèles de son diocèse. A Paris, chez Urbain Coustelier, rue Saint-Jacques, au Cœur bon. M. DCCII.*

[3] Il est à noter, cependant, que le volume ne porte pas le "*Privilège du Roy.*"

[4] "Les excommuniés fuieras, les dénoncés expressément;
"Quand excommunié seras, fais-toi absoudre promptement."

[5] Archives de la Marine, Canada, Correspondance générale, vol. 22.

craint de lui donner un certificat de manque de probité: D'Auteuil avait perdu la confiance du public.

La cour révoqua sa commission de procureur-général, qui datait du 2 juin 1680,[1] et l'ordonnance royale à cet effet fut envoyée aussitôt à M. de Vaudreuil, gouverneur du Canada, pour être enregistrée au Conseil Supérieur. On lit en effet dans les registres du Conseil, à la date du 21 novembre 1707:

"Vu par le Conseil l'ordre du Roi donné à Versailles le 30 juin dernier, signé Louis, et plus bas Phelipaux, et scellé, par lequel il casse et révoque Maître François-Magdeleine-Rüette D'Auteuil, son procureur-général en ce Conseil, et lui fait défense d'en faire à l'avenir les fonctions, et d'en prendre la qualité, à peine de désobéissance, et enjoint à M. le Marquis de Vaudreuil, gouverneur et lieutenant-général en ce pays, et à MM. Raudot, intendants en ce icelui, de tenir la main à l'exécution du dit ordre, et de le faire enregistrer au greffe de ce Conseil, le Conseil, ouï et ce requérant M. Charles Macart, conseiller, faisant les fonctions de procureur-général du Roi en ce dit Conseil, a ordonné et ordonne que le dit ordre sera enregistré au greffe d'icelui, pour être exécuté selon sa forme et teneur. RAUDOT."[2]

Le conseiller Macart[3] continua à exercer les fonctions de procureur-général, sans en avoir le titre, jusqu'au 17 octobre 1712. A cette date, Mathieu-Benoit Collet, avocat au Parlement de Paris, arriva à Québec avec une commission de procureur-général, et fut reçu et installé en cette qualité au Conseil Supérieur.

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[1] *Jugements du Conseil Supérieur*, t. II, p. 422.

[2] *Ibid.*, t. V, p. 704.

[3] C'était un marchand, dont la résidence était sur la place de l'église de la Basse-Ville.

III.—*Les Intendants de la Nouvelle-France.*

(Notes sur leurs familles avec portraits et armoiries.)

Par M. RÉGIS ROY.

(Présenté par M. B. Sulte et lu le 20 mai 1903.)

I

L'intendant, de 1663 à 1760, a été l'un des premiers personnages du pays, car ses attributions lui valaient une autorité plus étendue que celle du gouverneur, qui suivait d'un œil jaloux la promulgation de ses ordonnances, croyant souvent y trouver un empiètement sur ses prérogatives, et qui, alors, s'immisçait dans des choses où il n'avait aucunement droit, d'où surgissait des disputes, des querelles, se terminant par le rappel de l'un ou de l'autre, et parfois des deux.

L'intendant, par sa commission royale, recevait la gérance des affaires civiles criminelles et de police. Il prenait connaissance de toutes les matières concernant le roi, et de toutes les difficultés s'élevant entre le seigneur et le censitaire. Ses agents, les sub-délégués décidaient sommairement des petites causes, avec réserve d'appel à lui-même. Il jugeait aussi les affaires de commerce; en un mot, faisant en Canada les fonctions d'un juge-consul. La partie administrative du gouvernement lui était abandonnée, ainsi que celle des finances.

Le gouverneur ne conserva qu'une espèce de veto sur certaines mesures civiles, joint au commandement militaire et la gestion des affaires extérieures, tel que l'entretien des relations avec les autres gouvernements coloniaux, les indigènes et la métropole, et encore, l'intendant remplissait-il avec lui cette dernière partie des fonctions administratives. (Garneau.)

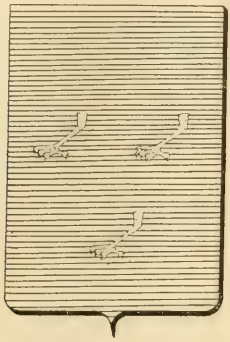
L'intendant avait donc une charge importante, et il fallait impérieusement que ce titulaire eut de l'expérience; et, de fait, il a toujours été choisi parmi les fonctionnaires royaux dans la mère-patrie. A peu d'exceptions près, l'intendant, tout en ayant la qualité précitée, avait surtout la bonne fortune d'être parent du ministre en faveur, ou d'une famille très en vue à la cour.

Par les pages qui se succèdent, on pourra constater facilement quel lien consanguin unissait les uns aux autres nos intendants et les ministres, mais le tableau qui suit immédiatement ces lignes, donnera un aperçu général de nos notes sur les familles des intendants de la Nouvelle-France.

Intendants.	Terme d'Office.	Pages.	Lieu d'Origine	Parenté.
1. Louis Robert	1663-65	67	Touraine	Fille mariée à l'un des neveux de Colbert.
2. Jean Talon	65-68	69	Hainaut	Neveu d'Omer Talon, avocat-général ; cousin de Louis Phélypeaux de Pontchartrain, père du chancelier ; cousin du grand'père de l'archevêque de Rouen et du maréchal de Bezons ; cousin de l'aïeule du chancelier d'Aguesseau ; aussi, parent avec le comte de Frontenac.
3. Claude de Bouteroue	68-70	73	Touraine	Ami de Colbert.
4. Jacques du Chesneau	75-82	76	"	Une tante mariée à M. Voyer d'Argenson ; un oncle sous-gouverneur de Louis XIV.
5. Jacques de Meulles	83-86	77	Poitou	Marié à mademoiselle Bégon, belle-sœur de Colbert ; oncle de notre intendant Bégon.
6. Jean Bochart	86-1702	79	Bourgogne	Madame de la Porte, aïeule du cardinal de Richelieu, était une demoiselle de Champigny ; le maréchal de la Meilleraye et l'évêque de Paris étaient parents des Bochart. Le duc César de Choiseul, pair et maréchal de France, était grand'oncle de notre intendant.
7. François de Beauharnois	1702-05	82	Orléanais	Plusieurs unions entre Beauharnais et Phélypeaux, et une avec les Séguier.
8. Jacques Raudot 9. Antoine-Denis Raudot	05-11	87	Bourgogne	La mère de Jacques est une demoiselle Talon ; protégés par le chancelier et le ministre Pontchartrain, leurs parents.
10. Michel Bégon	12-26	90	Orléanais	Neveu de Colbert ; épouse Jeanne de Beauharnais et devient parent des Phélypeaux.
11. Edmé-Nicolas Robert	1724	96	Touraine	Neveu de Louis Robert, premier intendant ; cousin du marquis de Seignelay.
12. Guillaume de Chazelles	1725	98	Auvergne	.....
13. Claude-Thomas DuPuy	26-28	99	Touraine	Voyer d'Argenson, de la Trémouille, etc.
14. Gilles Hocquart	29-44	101	Champagne	Son bisaïeul est marié à la cousine de Colbert ; son aïeul épouse une Talon ; son grand'oncle fut premier commis de Colbert.
15. François Bigot	44-60	104	Guyenne	Cousin du marquis de Puysieux et du maréchal d'Estrées.

II

LOUIS ROBERT, PREMIER INTENDANT.



Ouvrons n'importe quelle *Histoire du Canada,* à l'année 1663, et, au sujet de l'intendant que le roi venait de donner au pays, nous lisons invariablement dans chacune, à peu près dans les mêmes termes: —" Le 21 mars 1663, le roi nomma intendant, M. Robert, qui pourtant n'alla point en Canada."

M. Robert, il est vrai, ne s'est jamais soucié d'entreprendre le voyage d'outre-mer pour occuper sa charge. Pourquoi? C'est ce que nous nous sommes demandés, et, après mûres réflexions, avec ce que nous connaissons de l'époque, nous nous sommes dits: —" La santé de M. Robert pouvait être une cause pour ne point sortir de France, ou bien, croyait-il réussir à s'acquitter des devoirs relatifs à l'intendance sans plus se déranger, les jugeant faciles à conduire, même de si loin, ou bien donc, il ne lui plaisait guère de se risquer à une dangereuse traversée pour aller vivre au sein de peuplades farouches et barbares."

La dernière hypothèse doit prévaloir, selon nous, car la charge d'intendant, en France, était créée, surtout pour contrôler les actions et l'office du gouverneur, lieutenant-gouverneur, ou d'autre premier officier de province, et le même motif fournissait à la colonie naissante ce fonctionnaire.

Mais ce M. Robert, nommé ainsi tout simplement, qui est-il? Quel est son lieu natal, et à quoi s'occupait-il? Sujet de peu d'importance peut-être pour l'histoire du Canada, mais sur lequel il fallait jeter ou vouloir tenter de faire un peu de clarté pour parfaire la série des monographies des intendants de la Nouvelle-France, dans les lignes que nous nous étions tracées.

Garneau accole au nom du premier intendant du Canada, le titre de conseiller du roi, ce qu'il a cueilli, sans doute, au tome I des *Edits*

et Ordonnances. La commission de Robert comme intendant ne s'y voit point. A *l'Ordonnance* du 21 mars 1663, révoquant les concessions non défrichées, le roi étant au conseil avec M. de Mézy, gouverneur, et l'évêque de Pétrée, on lui ordonne de tenir la main à l'exécution ponctuelle du dit arrêt, etc. Toutes les personnes présentes au conseil apposent leur signature à ce document, mais celle de Robert est absente.

C'est tout ce qu'il y a, et avec d'aussi faibles données comment nous assurer de l'identité de notre personnage? Il faut avoir le goût et la persévérance d'un chercheur pour ne pas se rebuter.

Les intendants, tant en France qu'en Canada, furent choisis parmi ceux qui avaient déjà eu quelque emploi au ministère public.

Nos recherches à la bibliothèque du Parlement ainsi qu'au bureau des Archives à Ottawa, établissent positivement que M. Louis Robert fut notre intendant.

Louis Robert, sieur de Fortelle, est l'homme du temps. Il est l'oncle du chevalier Edmé-Nicolas Robert, nommé intendant en 1724. Ce Louis Robert, baptisé le 22 février 1636, fut fait conseiller d'Etat le 22 septembre 1666; intendant à Bergues, en 1667; deux ans plus tard à Dunkerque, et en Hollande en 1672. Il eut ensuite l'intendance des armées du roi en Italie, Candie et Hongrie—(selon D'Hozier)—mais d'après la commission de Robert que nous avons lue dans le volume 1, F. 1556-1669, collection Moreau Saint-Méry, aux Archives d'Ottawa, il est dit que Robert venait de servir comme intendant des finances de l'armée en Italie et en Candie. Ce brevet est un modèle: il est long, clair et bien précis. Les commissions d'intendants à la Nouvelle-France, émis par la suite, n'ont jamais été aussi complètes et bien détaillées que celle-là.

Enfin, Louis Robert reçut la présidence en la Chambre des Comptes, le 18 mai 1679.

Il fut l'impassible exécuteur des ordres impitoyables de Louvois pour écraser de contributions les peuples de Hollande, et de retour à Paris, avec le fruit de ses exactions, il aurait, dit-on, perdu toute sa fortune au jeu.[1]

Son père, Nicolas, conseiller du roi, fut trésorier de France, au bureau des finances, à Riom. Un des frères de Louis fut docteur en Sorbonne (Gilles). Ses deux filles épousèrent, l'une, le marquis de Livri, premier maître d'hôtel du roi; l'autre, le comte Des Marets,[2] grand-fauconnier de France.

Louis créa la branche de Fortelle, mais elle s'éteignit avec lui. Dans les preuves de noblesse de cette famille, enregistrées pardevant D'Hozier, juge d'armes de France, il est le VIIe degré dans la filiation.

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[1] *Colbert* par Clément, tome II, 1863.

[2] La mère du comte s'appelait *Marie Colbert*, sœur du ministre.

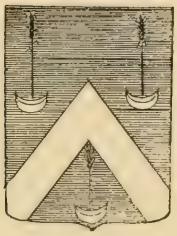
Nous avons remarqué que les noms favoris dans cette famille sont: *Antoine, Edmé* et *Nicolas.*

Son anoblissement date de juillet, 1481, par Louis XI; Antoine Robert étant alors notaire et secrétaire de ce monarque.

D'azur à trois pattes de griffon d'or, posées deux et une, formait leur blason.

III

Jean Talon, deuxième intendant.



Jean Talon fut de fait le premier intendant du Canada; M. Louis Robert, sieur de Fortelle, conseiller du roi, nommé intendant du Canada le 21 mars 1663, ne vint jamais au pays, et ne s'est troublé en aucune manière de cette charge que le roi lui donnait, n'ayant pas même assisté au Conseil d'Etat, de la date ci-haut, où étaient présents: le

roi, son ministre, M. de Mézy, Mgr de Laval, et les membres nouvellement créés du Conseil Souverain de Québec.

De plus, la lettre du Conseil Souverain, adressée à Colbert le 13 juin 1664, semble indiquer qu'il n'y eut pas d'intendant de police, finances, etc., en Canada, avant Talon.

Par lettres-patentes du 23 mars 1665, Talon fut nommé intendant de la justice, police et finances "en les pays de Canada, Acadie, et Isle de Terreneuve, et autres pays de la France septentrionale." Cette commission royale fut enregistrée à Québec, le 6 juillet 1665.

Comme il n'entre pas dans notre plan de parler de ce qu'à fait cet intendant, car cela ne serait que répéter nos bons historiens, nous allons passer outre et n'aborder que du nouveau, ou ce qui est généralement moins connu, ayant trait principalement aux choses en dehors de son administration.

En novembre 1666, Talon rappelle au roi que son séjour avait été fixé à deux ans, et il demande son congé lorsque cette période serait accomplie.

Vers la fin de 1668, l'état de sa santé, des affaires de famille, et peut-être des difficultés avec le gouverneur, provenant moins de la diversité de vues que de la différence de caractère, engagèrent Talon à repasser en France pour remettre sa charge. Il siègea pour la dernière fois de son premier terme, au Conseil, où il signa le procès-verbal de la séance, le 22 août 1668.

Le 5 novembre 1668, le Conseil mande à Colbert que Talon va repasser en France, estimant sa santé assez forte pour faire le voyage, et qu'il pourra l'éclairer sur les affaires du Canada. Le 10, Talon assiste à une séance du Conseil, et il est cité comme ci-devant intendant.

Le séjour de Talon à Paris ne fut pas inutile au Canada, car, s'il n'était plus l'intendant, il y avait toujours des intérêts de commerce considérables, et son influence à la cour n'était pas diminuée. Avant de passer au Canada, il avait rempli avec succès les différentes charges suivantes: en 1653, commissaire de l'armée; intendant du Hainaut de 1655 à 1665. En 1651, on lui accorda de plus l'intendance voisine d'Artois, et il fut choisi pour régler les limites de France et des Flandres.

Mais on ne pouvait se passer de Talon au Canada, et sur la demande du roi (14 mai 1669), il consentit à retourner en Amérique. Le 22 juin, le secrétaire de Talon, le sieur Patoulet, surveillait l'embarquement de troupes, etc., à La Rochelle, pour le Canada. L'armement de Talon en cette instance, évaluée à deux cent mille livres, après une navigation orageuse, se perdit dans un naufrage, sur les côtes du Portugal, où l'intendant faillit périr. Il s'embarqua de nouveau l'année suivante, et parvint à Québec le 8 août 1670, pensant encore faire naufrage près

de Tadousac, où une tempête jeta son navire sur des roches et le mit sur le côté.

Le 15 septembre, il faisait son entrée au Conseil, pour la première fois depuis son retour de France.

Au printemps de 1670, durant l'absence de Talon, le sieur Patoulet[1] commença à faire travailler la brasserie, la bâtisse étant terminée et prête à fonctionner.

Le 11 novembre 1670, Colbert lui fait avoir la capitainerie de Mariemont, en Hainaut. Le 14 mars suivant, Louis XIV le fit baron des Islets, en Canada. Cette même année, Talon fait son testament, instituant son légataire universel, Jean-François Talon, son neveu.

M. De Courcelles ayant demandé son rappel,[2] M. de Frontenac arriva en 1672, pour le remplacer. Sa réputation qui le précéda, fit désirer à Talon de remettre sa charge.[3] Il jugea la colonie trop petite pour occuper séparément deux hommes fort actifs et qui ne seraient pas disposer à dépendre l'un de l'autre, ni par conséquent agir avec ce concert qui exige des concessions réciproques. Il demande sa retraite. Le roi lui permit de rentrer en France à l'automne de 1672.

Le roi changea la baronnie des Islets en comté d'Orsainville, en mai 1675, étendant l'investiture à la postérité mâle et femelle, contre la règle générale, et les lettres-patentes attestent le cas que le roi faisait de Talon, car elles exposent que sans cette extension à la postérité féminine, Talon n'aurait pas accepté cette faveur. Néanmoins, il offrit ce comté en vente à l'évêque de Québec, et le contrat fut ratifié par madame Talon et son neveu Jean-François; cependant, lorsqu'il offrit au roi, en 1680, toutes ses propriétés du Canada, sans conditions, il demanda que le titre de comté donné à sa terre d'Orsainville, au Canada, fut transféré à sa terre de Locquignol, dans le Hainaut, qu'il avait reçu en don du roi, à son départ pour l'Amérique.

A son retour en France en 1672, Talon devint secrétaire du cabinet, puis valet de chambre du roi.[4]

Le 13 novembre 1680, Du Chesneau fit l'inventaire des propriétés de Talon, au Canada: le maison de la brasserie; celle appelée Godefroy; celle présentement habitée par lui, M. Du Chesneau; un grand bâtiment situé à la Basse-Ville appelé le magasin, et la terre appelée d'Orsainville.

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[1] Patoulet fut contrôleur de marine à Rochefort en 1673; commissaire-général au même port en 1676; intendant aux Iles, de 1679-1683; intendant de marine à Dunkerque. Mort 8 avril 1695. (*Colbert par Clément, Tome III.*)

[2] De Courcelles, gouverneur de Thionville, avant de l'être en Canada; ensuite commandant à Toulon. Il mourut le 24 octobre, 1698. (*Colbert par Clément, Tome III.*)

[3] Talon connaissait bien Frontenac, puisqu'ils étaient parents.

[4] *Colbert par Clément, tome II.*

En 1685, le 15 mai, De Meulles, à la demande du ministre, estime la brasserie à huit mille livres; Talon en demandait quarante mille. L'intendant se proposait de prendre la brasserie pour le palais et les magasins. Tout en consentant à prendre les propriétés de Talon, le roi semblait trouver son évaluation élevée.

Il parait que Talon, à ses heures, était poète. Il adressait quelque fois à la Mère Boulié de la Nativité des madrigaux et des épigrammes auxquels elle répondait sur-le-champ, en même style, et ces pièces étaient estimées de tous les connaisseurs.

L'extérieur de Talon annonçait son mérite.

Nous donnons son portrait d'après une peinture de M. Hamel à l'Hôtel-Dieu de Québec.

Les Talons de Paris blasonnaient: *d'azur au chevron d'argent accompagné de trois épis montants d'or, soutenus chacun d'un croissant montant d'argent.*

Il y avait des Talons dans le Hainaut; c'était un rameau de la même famille, car ils ont presque les mêmes armoiries. Un Jean Talon a été échevin de Le Quesnoy (Hainaut), en juin 1698, et blasonnait: *d'azur à trois croissants d'or chacun surmonté d'une étoile de même, et posés deux et un.*

Talon était parent des célèbres avocats-généraux de ce nom. Cette famille illustre dans la robe, suivant des *Mémoires,* tire son origine d'Irlande, où l'on prétend qu'elle a possédé des terres et des places considérables.

Jacques Warœus, dans ses *Antiquités Irlandaises,* marque qu'a Tulli-Félim Alfelah, sur la rivière de Slane, Simon Lombard et Hughes Talon fondèrent en 1314 un couvent de l'ordre des Hermites de Saint-Augustin. M. Allemand, avocat au Parlement de Paris, dans son *Histoire Monastique d'Irlande,* étend ce qu'avait écrit Warœus, et s'exprime ainsi: — " Dans le comté de Caterlog, à Tulli-Félim, autrement nommé Tollog ou Folaghe, petite ville sur la rivière de Slane, diocèse de Laghin, il y a eu un couvent fondé l'an 1314, par deux Français: Simon Lombard et Hughes Talon. Il y a même aujourd'hui, dit-il, un augustin irlandais dans le grand couvent de Paris, nommé le père Talon, qui m'a assuré descendre de ce Hughes Talon, qui sur la fin de ses jours se fit augustin dans le même couvent qu'il avait fondé."

Et M. Allemand continue:—" Je pourrai prouver dans peu que ce Talon était un des prédécesseurs de M. l'avocat-général Talon, si fameux aujourd'hui dans l'Europe."

Le premier Talon qui vint d'Irlande en France, pour s'y établir, où il fut colonel sous Charles IX, s'appelait Artus. Son fils, Jean, s'établit à Paris, où il fut nommé conseiller d'Etat, le 20 mars 1563.

Marie-Suzanne Talon, fille d'Omer, troisième degré dans la généalogie, morte le 1er octobre 1653, était mariée à Louis Phélypeaux, seigneur de Pontchartrain, président en la Chambre des Comptes, père du chancelier de Pontchartrain.

Catherine, autre fille d'Omer,[1] épousa, en 1642, Jean-Baptiste Le Picard. Elle eut trois filles; l'aînée, Claire-Eugénie, fut la mère du chancelier d'Aguesseau.

La dernière fille d'Omer épousa Pierre Bazin, grand'père de l'archevêque de Rouen et de Jacques Bazin de Bezons, maréchal de France.

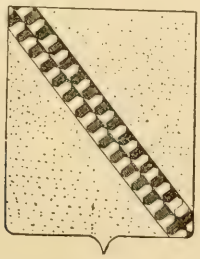
D'un autre Omer (VIe degré): Angelique-Louise devint la femme de Louis-Joseph de Montcalm, marquis de Saint-Véran, le 3 octobre 1736.[2] Montcalm fut maréchal de camp et commandant des troupes du roi au Canada.

Ces alliances que je place sous vos yeux sont parmi les principales contractées dans la famille Talon. Elles prouvent son influence.

Pour conclure, disons qu'il y eut une branche cadette aussi implantée à Paris; sur cette branche, on trouve plusieurs Jean Talon, et il est fort probable que notre intendant y appartient.[3]

IV

Claude de Bouteroue, troisième intendant.



Il n'y a pas long à dire sur cet intendant de la Nouvelle-France, car il a été très peu de temps au Canada, et comme depuis longtemps cette famille est éteinte, nos recherches généalogiques n'ont pas été beaucoup fructueuses; cependant, voici ce que nous avons trouvé et glané.

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[1] Omer, né vers 1559, à St-Questin, dans le Hainaut, entra au barreau de Paris en 1613; nommé en 1631 avocat-général au Parlement. Mort, 29 décembre 1652; a laissé des *Mémoires* estimés. (*Colbert par Clément, Tome I, p. 31.*)

[2] Elle était petite nièce de Jean Talon qui fut notre intendant. (*Guénin, La Nouvelle-France, vol. II.*)

[3] Ces notes sont prises dans un *Dictionnaire de la noblesse*, par *De La Chesnaye-Des-Bois* et *Badier*, 3e édition, 1873.

Nos historiens nous disent que ce gentilhomme vint remplacer Talon. Ils nous le donnent comme savant, poli et gracieux; mais qui ne pouvait surpasser, ou même, égaler son prédécesseur.

La commission de Bouteroue à l'intendance du Canada date de St-Germain-en-Laye, du 8 avril 1668, et fut enregistrée à Québec le 22 octobre suivant. Il siège au Conseil Souverain, en première instance, le 7 septembre 1668, et en dernière, le 22 octobre 1670. Il occupa donc cette charge juste l'espace de deux ans.

Au départ de Talon, à l'échéance de son premier terme d'intendant, ici, M. de Ressan, secrétaire de M. de Tracy, lieutenant-général du roi en Amérique, avait mis en jeu toutes ses influences pour obtenir le poste vacant, mais on ne lui crut pas assez de qualités — qualités inhérentes à tel office — pour le nommer, et ce fut Claude de Bouteroue, bien en cour, respecté de tout le monde, et très instruit, qui succéda à Talon.

M. de Courcelles, le gouverneur, trouva que l'intendant dépendait trop de Mgr de Laval et des jésuites, et la bonne entente entre ces deux hauts fonctionnaires étant en danger, le roi rappela M. de Bouteroue.

Colbert, là-dessus, mandait à Courcelles, qu'avec le temps, il eut certainement mieux apprécié l'intendant; que M. de Bouteroue est en fort bonne estime à Paris, et qu'il aurait rempli dignement les fonctions de son emploi.[1]

Mademoiselle de Bouteroue qui était en Canada avec son père, fut marraine, en 1670, du chef iroquois Garakonthié, à la conversion de cet homme.

M. de Bouteroue vivait en 1677, à Paris, puisque Colbert, dans une lettre à Frontenac, dit qu'il vient de consulter Talon, Bouteroue et autres, sur le commerce de l'eau-de-vie avec les sauvages.

Il mourut en 1680.[2]

Le père de notre intendant, qui avait aussi nom Claude, a été conseiller en la Cour des Monnaies. Il est l'auteur d'un traité sur les monnaies anciennes de France. Pierre Séguin, doyen de St-Germain l'Auxerrois, possédait un cabinet contenant toutes les monnaies anciennes de la France, en original, et c'est sur cela que travailla M. de Bouteroue pour la confection de son traité (1669).

Bouteroue, père, mourut en 1674.

Un sieur Bouteroue, lieutenant de l'Amirauté, à Dunkerque, reçut en 1675 une gratification du roi, de mille livres, en considération du travail qu'il venait de faire sur les monnaies anciennes et nouvelles du royaume.

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[1] *Colbert à Courcelles, 15 mai 1669.*

[2] *Béchard, Monographies, page 46.*

Je sais que ce lieutenant de l'Amirauté appartenait à la famille de l'intendant de la Nouvelle-France, mais je n'ai pu découvrir son premier nom et établir son identité.

Le nom de notre intendant s'orthographiait de deux façons: *Bouteroue,* que nous connaissons, et *Boutheroue.*

Un parent, Hector de Boutheroue, écuyer, sieur de Bourneuf, était co-propriétaire en 1665, du canal de Briare et du canal de la Loire à la Seine.

Claude était qualifié chevalier, et possédait la seigneurie d'Aubigny.

La famille comptait de bonnes alliances, entr'autres avec les Le-Clerc de Lesseville, de robe distinguée.

Les Bouteroue étaient originaires de la Touraine. Ils blasonnaient: *D'or, à la bande vairée d'argent et de sable.*

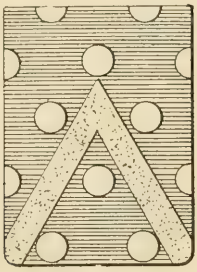
Nos premiers intendants, sans doute, sortaient de bonnes familles, mais ils étaient tous gens de robe ou fonctionnaires publics. Le premier, Robert, ne fut intendant que de nom; la perspective d'un voyage vers des contrées lointaines, peuplées de tribus cruelles et sanguinaires, avait de quoi l'effrayer. Et c'est pourquoi, probablement, il ne vint jamais au Canada. A son tour, Talon dut s'y prendre à deux fois pour faire un stage de quatre années. Qui se souciait beaucoup alors de passer à l'intendance du Canada? Il fallait une forte dose de courage pour entreprendre un voyage aussi long et dangereux; c'était un mois et plus sur l'océan, en butte aux tempêtes, aux corsaires, etc., puis, résidence dans un pays sauvage.

Je ne crois pas que Bouteroue ait sollicité l'office d'intendant en la Nouvelle-France. On a dû le lui offrir.

Après le deuxième terme de Talon, qui venait remplacer Bouteroue, il y a une période de trois ans, où le Canada n'eut point tel fonctionnaire, ce qui me confirme dans mes déductions que nos premiers intendants n'ont pas *couru* après cette charge, pour employer une expression répandue.

V

Jacques Du Chesneau, quatrième intendant.



Il y avait trois ans que le Canada n'avait pas d'intendant, quand M. Du Chesneau fut appelé à ce poste, en 1675. Sa commission est du 30 mai, de cette année. M. Du Chesneau, depuis dix ou douze ans, était commissaire dans la généralité de Tours; à la date de sa nomination à l'intendance du Canada, il était conseiller du roi, trésorier de France et général des finances de la Touraine, seigneur de la Doussimière et d'Ambault.

Du Chesneau recevait douze mille livres par an d'appointements, comme intendant. De plus, pour les frais de son déplacement, il reçut trois mille livres.

Cette famille est originaire de Touraine. Guillaume Chesneau, chevalier, seigneur des Breux, Montay et la Doucinière, échanson du roi, fils de Jean Du Chesneau, (chevalier des dits lieux; chambellan de Charles VII,) et de Robine Fumée — qui eut d'Anne de la Lande, deux garçons. Nous avons relevé plusieurs alliances entre les maisons Voyer d'Argenson et de Fumée. Dans la généalogie Fumée, Jean du Chesneau, mari de Robine, est qualifié seigneur des Pruneaux et de Montrié.

M. Robert de la Lande, parent de Jacques du Chesneau, était d'un mérite si généralement reconnu que le 9 mars 1646, il fut pourvu de la charge de sous-gouverneur de Louis XIV.

Les influences en cour de Jacques étaient donc très fortes, et c'est ce qui explique comment il a pu rester sept ans en Canada malgré ses querelles avec ceux qui l'entouraient, et les réprimandes et les censures souvent répétées du ministre. Parmi les plus sévères, citons celles où Colbert (2 juin 1680) lui dit qu'il fera mieux de repasser en France et se retirer à Tours, s'il n'est pas résolu à exécuter ponctuellement les ordres qu'il lui donne, et (du 2 mai 1681) l'avertissant de la part du roi que si son animosité contre M. de Frontenac ne cesse pas de suite, la première lettre qu'il recevra sera celle de sa révocation.

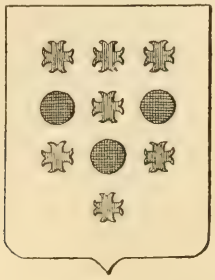
Son intendance, enfin, se termine le 9 mai 1682, et il repasse en France.

Son fils, qui prenait le titre de chevalier, l'avait suivi en Canada.

Les armes de cette famille se formaient comme suit: — *D'azur, semé de besants d'argent, au chevron d'or brochant sur le tout.*

VI

Jacques de Meulles, cinquième intendant.



Cet intendant n'a pas fourni une longue carrière en la Nouvelle-France (1682-86), et l'histoire est brève sur son compte.

Durant la première partie de son administration, il fit bien tout son possible pour se conformer aux instructions reçues de son auguste maître, le roi, et particulièrement de vivre en bonne intelligence avec le gouverneur et le clergé, mais ce n'était pas chose facile, et il fut sujet à réprimande et censure à ce titre, comme son prédécesseur.

Mais, par exemple, on lui avait donné pour gouverneur du pays, un officier impossible à plaire; un homme qui, dans tous les emplois publics où il avait passé, souleva une juste indignation à cause de sa conduite; qui, en un mot, s'était acquis la haine générale.[1] Et, après l'avoir essayé un peu partout, on l'envoya au Canada.

La nomination de M. de Meulles fut datée de St-Cloud, le premier mai 1682, et enregistrée à Québec, le 9 octobre suivant.

Jacques de Meulles s'intitulait: chevalier, seigneur de la Source, et grand bailli d'Orléans. Sa femme, une demoiselle Bégon, était la sœur de Michel Bégon,[2] intendant à Rochefort, père de Michel Bégon, notre intendant. Cette union le faisait cousin de la femme du ministre Colbert, fille de Charon de Ménars et de Marie Bégon.

En 1661, Colbert envoya dans toutes les provinces des commissaires choisis parmi les conseillers maîtres des requêtes. Il voulait

[1] Antoine Le Febvre de la Barre. Voir la correspondance de Colbert à Mazarin, et surtout la lettre du 16 octobre 1659.

[2] M. Dudouyt à Mgr de Laval, 26 mai 1682.

connaître l'état du pays, ses forces, ses ressources, ses besoins, etc. Charles Colbert, le frère du ministre, eut à visiter pour sa part la généralité de Tours, dont l'Anjou faisait partie. Il fit cette visite en 1664. Par ce rapport, le ministre devenait plus intime avec les affaires de son cousin.

Dans son *Mémoire sur la noblesse du Poitou*, Charles Colbert dit: — " En la paroisse de Cerizay, eslection de Thouars, il y a le sieur François Meules, seigneur de la forest de Montpensier, qui réside en sa maison de la Roche-Cerizay, qui vaut quatre mille livres de rente; il a servi quelque temps en qualité de volontaire. C'est un homme docte et qui s'applique à écrire." [1]

Ce François de Meules fut le père de Jacques, notre intendant. Il y eut en France une certaine zône, ou plutôt un coin du pays qui, plus que tout autre, a fourni des fonctionnaires éminents et des officiers de mérite à la Nouvelle-France, ayant pour foyer: Tours et Orléans comme extrême périmètres: les Lusignan, de Lantagnac, Alogny de la Groie, de Meulles, Bégon, Du Chesneau, Beauharnois, Robert, etc.

J'ai trouvé que vers 1400, Pierre Flory ou Fleury, chevalier, seigneur de Bouillé St-Paul, près Thouars, avait pour femme Françoise de Meulles, de Fraigne-Chabot.

Ce Flory ou Fleury avait trois sœurs, et l'une d'elles: Jeanne, épousa Regnault de Meulles.[2] Ceci nous fait voir un peu l'antiquité de la maison des De Meulles.

L'alliance de Jacques de Meulles à mademoiselle Bégon, qui le rapprochait de Colbert, est la plus importante qu'il m'a été donné de relever. Elle en vaut beaucoup d'autres.

Les de Meulles blasonnaient: *d'argent à trois tourteaux de sable, accompagnés de sept croix, ancrées de gueules, trois en chef, un, deux, un.*

De Meulles fut accusé de s'occuper de faire du commerce à son compte, par Denonville, mais La Hontan dit qu'il ne fit de tort à personne; au contraire, il procura du pain à mille pauvres gens qui seraient morts de faim sans son secours.—" Il a fort bien fait son devoir, étant très équitable et rendant bonne et prompte justice à tous ceux qui s'adressent à lui. Il est zélé pour la justice et punit le crime sans rémission." (*Histoire de l'Hôtel Dieu de Québec.*)

Dans son *Mémoire* au roi, du 26 août 1683, De Meulles disait en parlant du Canada: — " On peut assurément trouver dans la France septentrionale des climats aussi variés qu'en Europe avec plus de belles terres. Il n'en tient qu'à Votre Majesté de jeter ici les fondements de la plus grande monarchie qui soit au monde."

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[1] *Revue historique de la noblesse*, vol. II, p. 149.

[2] D'Hozier, *Armorial de France*, VIII, p. 606.

Le 31 mai 1686, le ministre informait de Meulles que M. Bochart de Champigny était nommé pour le remplacer. Bochart arriva à Québec en juillet 1686, et de Meulles en partit en la première semaine d'octobre pour retourner en France, où depuis je le perds de vue.

VII

Jean Bochart, sixième intendant.

Le 24 avril 1686, le roi, étant alors à Versailles, nomme Jean Bochart intendant du Canada. Ces lettres-patentes furent enregistrées à Québec, le 23 septembre suivant, et, le lendemain, le nouveau titulaire siégeait officiellement au conseil.

Madame Bochart accompagnait son mari; elle retourna en France probablement en 1696 ou 1697, et revint en Canada en 1698, sur le vaisseau du roi, *Le Poly*.

Le terme d'office de Jean Bochart couvre une période de seize années, et c'est le plus long stage qu'ait fait aucun autre semblable officier sous le régime français, en Canada. La chose est toute à son crédit et fait éloquemment son éloge.

Jean Bochart était issu d'une famille originaire de Bourgogne, remontant à Guillaume Bochart, seigneur de Noroi, gentilhomme servant du roi Charles VII, qui était de Vezelai.

Le fils de Guillaume, Jean I, fut conseiller au Parlement de Paris en 1490. C'était un sage magistrat, et il fut préposé à la présidence de ce Parlement.

Le fils de Jean eut une fille qui épousa François de la Porte. De cette alliance naquit Suzanne de la Porte, destinée à devenir plus tard la mère du célèbre cardinal Richelieu.

Jean II se signala au Parlement de Paris par un plaidoyer hardi qu'il prononça en présence de François I, touchant la *Pragmatique Sanction* contre le *Concordat*.

Cette hardiesse lui fit des affaires à la cour. Il fut mis en prison, et n'en sortit que deux ans après à la prière du maréchal d'Annebaut, son ami particulier. Il épousa Jeanne Simon, nièce de Jean, évêque de Paris, qui lui donna sa terre de Champigny.

La fille cadette de Jean II fut la bisaïeule du maréchal de la Meilleraie. C'est au maréchal de la Meilleraie dont il avait à se plaindre qu'un gentilhomme breton disait:—"*Si je ne suis pas maréchal de France, je suis du bois dont on les fait! Aussi, le deviendrez-vous,* lui dit De la Meilleraie, *quand on les fera de bois.*"

Jean V fut surintendant des finances sous Henri IV. Après la mort de Jérôme d'Hacqueville, en 1628, Louis XIII mit M. de Champigny à la tête du Parlement de Paris.

Jean VI, qui fut l'aïeul de notre intendant, épousa Marguerite le Charon. Cette alliance le fait beau-frère de César, duc de Choiseul, pair et maréchal de France. Cette famille Le Charon porte presque les mêmes armes que Le Charon, beau-père de Colbert, et je les crois parentes à un degré très rapproché.

Le neuvième chainon dans la filiation, et le huitième du nom *Jean*, c'est notre intendant.

En 1699, il est administrateur conjoint de la colonie, le gouverneur étant mort. De Champigny voulut avoir la place, mais M. de Callières, plus puissant en cour, l'emporta.

En 1697, un fils de notre intendant—ce doit être Jean-Alphonse—servit à titre de lieutenant sur l'*Amphitrite*, mais le premier mai 1698, le roi lui donna une commission de capitaine, à la place du sieur de L'Espinay. Le 3 mai 1700, le roi lui accorde une compagnie, et le 18 mai 1701, le capitaine reçoit un congé de neuf mois.

Au mois de mai 1701, le roi nomme Jean Bochart intendant de la marine au Hâvre-de-Grâce, poste vacant, que la famille de M. de Champigny avait demandé au roi. En 1702, il retourne en France, et son fils l'accompagne, laissant sa place à M. de Courtemanche.[1]

Le 5 octobre 1702, le Conseil assemblé, Bochart remet son autorité d'intendant à François de Beauharnois et part aussitôt pour la France. Il mourut au Hâvre-de-Grâce en 1720.

Il avait épousé Marie-Madeleine de Chaspoux,[2] dame de Verneuil et du Plessis-Savari, (morte en 1718) et non pas, comme l'ont donné certains historiens, Madeleine Houel, veuve de Jean de Boissers.[3]

Madame de Champigny était cousine de Mgr de Laval au troisième degré.[4] Il parait qu'elle empêchait souvent la punition des coupables jugés par le Conseil Souverain. On s'en plaignit au ministre disant qu'elle agissait ainsi animée par des principes de charité mal entendue. Le ministre avisa l'intendant de se mêler de ces choses.

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[1] Rapport de M. Richard sur les Archives du Canada.

[2] Fille de Jacques de Verneuil, trésorier de France, à Tours.

[3] *Edits et Ordonnances*, I, p. 48.
Histoire des Canadiens-Français, IV, p. 42.

[4] *Laval*, par Gosselin, 1901, p. 426.

Notre intendant eut quatre enfants:[1]

1° Jean-Alphonse, prêtre, mort à Paris, 1723.

2° Jacques-Charles, né 22 septembre 1712.

3°, 4° Guillaume et Jean-Paul.

Jacques-Charles continua la lignée, et s'intitulait seigneur de Champigny, de Noroi et de Poinci, marquis de Sainte-Marie, en Amérique. Il fut gouverneur de la Martinique, où il mourut le 20 mai 1754. Sa femme était Marie-Madeleine de Boisseret, fille de Louis, marquis de Sainte-Marie. Les Boisseret étaient seigneurs d'Herblay.

Il y eut deux autres branches dans la famille Bochart sous le nom de Champigny; par Jean-Paul Bochart de Champigny, fils de Jean VIII (notre intendant) et par François Bochart, *dit* de Champigny, seigneur de Saron, second fils de Jean V.

Blason: d'*azur à un croissant d'or, abaissé sous une étoile de même.*

Il y a encore des Champigny en France.

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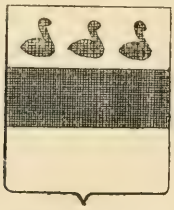
[1] *Dictionnaire de La Chesnaie-Desbois et Badier.*

VIII

Francois de Beauharnais.



Dans les titres de la famille de ce nom l'on écrivait: *Beauharnois, Beauharnoys,* et *de Beauharnois.* C'est l'ancienne orthographe; aujourd'hui l'on remplace la lettre o par a.

Cette famille originaire de l'Orléanais nous intéresse tout particulièrement, car elle nous a donné un intendant, de 1702 à 1705; un gouverneur-général, de 1726 à 1747; et plusieurs autres de ses membres sont venus demeurer en Canada, durant plusieurs années.

Disons d'abord que cette famille, distinguée dans l'ordre de la noblesse par ses anciens services, soit dans le militaire, soit dans la principale magistrature, a produit en original les titres justificatifs de ses filiations depuis François de Beauharnais, seigneur de Miramion, etc., auteur du VIe degré, et de plus une généalogie manuscrite dressée en 1644, par Jacques Girault, célèbre avocat au siège Présidial d'Orléans, à l'occasion sans doute, de quelque partage, qui était alors en litige.

Le premier Beauharnais enregistré dans cette filiation est Guillaume, seigneur de Miramion et de la Chaussée. Il épousa, le 20 janvier 1390, Marguerite de Bourges.

Détail curieux à noter: son fils aîné fut l'un des témoins au procès fait pour la justification de la Pucelle d'Orléans.

Aignan de Beauharnais, fils de François, (VIe degré) épousa Marguerite de Choisy. Il eut un fils, qui se maria en 1645 avec Marie, fille de Jacques de Rubelles, conseiller et secrétaire du roi. Anne de Beauharnais, fille de François, devint la femme de Paul Phélypeaux, seigneur de Pontchartrain, le 11 juin 1605. C'est un parent du ministre de ce nom.

Marie-Anne, petite-fille de François II de Beauharnais (VIIe degré) épousa, le 16 septembre 1683, son cousin Jean Phélypeaux, comte de Montlhéry, etc., et intendant de Paris.

La trisaïeule du chancelier Séguier était une Beauharnais.

Au moyen de ces alliances, et d'autres faites par la suite, les Beauharnais acquéraient de l'influence.

Michel de Beauharnais, fils de François II, fut prêtre et aumônier de Gaston, duc d'Orléans.

Jean de Beauharnais, chef du VIIIe degré dans la généalogie de la famille, fut secrétaire de la chambre du roi Louis XIII; gentilhomme ordinaire de sa chambre, etc. C'est le grand'père de notre intendant et de notre gouverneur-général.

François (IXe degré), père de nos fonctionnaires, est qualifié: chevalier, seigneur de la Boische, de la Chaussée, de Beaumont, de Beauville, etc. Il épousa, en septembre 1664, demoiselle Marguerite-Françoise Pyvart de Chastullé.

Voici la liste de leurs enfants:

1° *Jacques*, capitaine au premier bataillon du régiment du Maine, tué au siège de Mayenne.

2° *François* de Beauharnais, qualifié chevalier, baron de Beauville, seigneur de la Chaussée, de Beaumont, etc., conseiller du roi en ses conseils, et intendant de ses armées navales, et qualifié aussi, Haut et Puissant Seigneur, dans les actes qui le concernent; fut successivement commissaire de la marine; commissaire des armées navales; intendant de justice, police et finances des pays de la Nouvelle-France, Acadie, île de Terreneuve et autres pays de la France Septentrionale, le 1er avril 1702. Il est nommé à l'intendance générale de la marine en 1704, mais il ne partit du Canada qu'en l'autome de 1705. Le 1er janvier 1706, le voilà intendant de l'armée navale du roi[1] commandée par le comte de Toulouse. Le 2 avril 1707, par un brevêt du roi, il obtient le "Port Maltais", en Acadie, la rivière comprise, de quatre lieues de front sur deux de profondeur, tirant du côté de la Hêve, à l'est, quart nord-est, avec les îles et ilettes adjacentes avec droit de haute, moyenne et basse justice, et le 25 juin, de la même année, cette terre est érigée en baronie sous le nom de Beauville.

Le 1er janvier 1710, il est intendant de la marine, ayant inspection générale sur les classes des officiers, mariniers et matelots du royaume. Le 24 mars suivant, il passe intendant de la marine à Rochefort,[2] puis intendant de la justice, police et finances de la généralité de La Rochelle, le 30 du même mois, et commissaire départi pour l'exécution des ordres du roi dans le pays d'Aunis et îles adjacentes, et dans les provinces de Saintonge et d'Angoumois; intendant des armées navales dans la mer Océane, et enfin, intendant général des armées navales, le 1er avril 1739.

Il avait épousé demoiselle Anne des Grés, morte sans enfants, le 24 septembre 1731, âgée de 63 ans.

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[1] Succédant à M. Herbaut tué dans un combat.

[2] Il y est encore intendant en 1723. (*Rapport de M. Richard*, sur les *Archives*).

Cet intendant fit un court séjour en Canada. Il débarqua à Québec le 29 août 1702.[1]

L'intendant de Beauharnais fit enregistrer sa commission datée à Versailles, le 1er avril 1702, et parut officiellement au Conseil à Québec, le 5 octobre 1702.

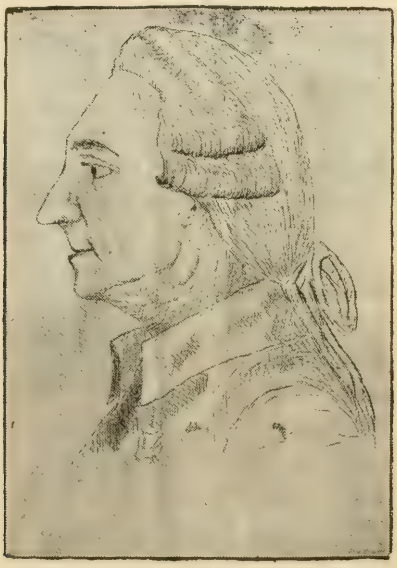
Il fit une traversée heureuse et très courte pour la saison dans laquelle il était parti de France.

En chemin, le vaisseau qui le portait fit deux prises anglaises, l'une à la hauteur des Açores, et l'autre, sur le grand banc de Terreneuve.

M. de Beauharnais parut pour la dernière fois sous le caractère d'intendant, au Conseil, le 17 septembre 1705; les messieurs Raudots, ses successeurs venaient de débarquer à Québec.

Notre intendant mourut le 8 octobre 1746, âgé de 81 ans, après 60 ans de service.

3° Jean François.



4° Notre gouverneur, Charles de Beauharnais, chevalier de la Boische, reçut le titre de marquis dans les provisions du roi le nommant au poste de gouverneur du Canada. En 1686, il fut admis dans les gentilhommes gardes de la marine, ensuite enseigne le 1er janvier 1696. En 1697, il se rend à Brest, et s'embarque sur le *Superbe*, pour faire les fonctions de commissaire sur l'escadre du marquis de Nesmond. Il passe capitaine d'une compagnie franche d'infanterie de la

[1] Corr. Générale, Can., Vol. XX, folio 106.

marine, le 18 janvier 1699; capitaine de frégate, 9 mai 1707; capitaine de vaisseau, 23 avril 1708; chevalier de Saint-Louis et gouverneur du Canada, le 11 janvier 1726; commandeur surnuméraire de l'ordre militaire de Saint-Louis, le 22 mars 1732; chef d'escadre des armées navales, le 1er mai 1741, et lieutenant-général d'icelles, le 1er janvier 1748.

Il parvint à tous ces grades par ses services signalés, et donna des marques de la plus grande valeur dans toutes les occasions qui se présentèrent.

Il épousa, le 6 août 1716, Rénée Pays, veuve de .... Galichon, et de Pierre Hardouineau, seigneur de Laudianière, etc.[1]

Il mourut le 12 juin 1749.

5° Claude de Beauharnais de Beaumont qui continue la lignée, formant le dixième chaînon ou degré, prit pour femme le 11 mai 1713, Rénée Hardouineau, fille de Pierre, et de Rénée Pays.

Si vous voulez vous égayer, établissez les nouveaux liens de parenté entre les deux frères Charles et Claude, causés par leurs mariages.

Claude de Beauharnais de Beaumont vint en Canada.

La sœur Juchereau, dit dans son *Histoire de l'Hôtel-Dieu, de Québec*:—" Le vaisseau du roi, le *Héros*, était proche; il était commandé par M. Beaumont, frère de M. de Beauharnais, ci-devant intendant du Canada.

Dans le *Bulletin des Recherches Historiques*, de Lévis, numéro d'octobre 1897, à la page 156, M. Sulte dit:[2] " *Claude-Charles*, autre neveu, etc, vint au Canada, et, en 1729, il obtint la seigneurie de Beauharnais." Ce ne peut être que M. de Beaumont, frère de notre intendant. Dans la généalogie de la famille que j'ai par devant moi, il n'y eut qu'un Claude, neveu de l'intendant François et du marquis Charles, et ce Claude fut comte et créa la seconde branche des Beauharnais.

Nous en reparlerons dans un moment.

Claude, frère de François, fut lieutenant et capitaine, et vint en Canada. En 1703, il commandait la flute *la Seine*, ayant ordre de venir en Amérique prendre un chargement de mâts, pour la France.

En 1729, il obtint la seigneurie de Beauharnais; il était alors lieutenant de vaisseau. " On le retrouve avec le titre de chevalier de Saint-Louis (1740-1) *et qualifié de Sieur de Beaumont*, dit M. Sulte. — Mais sans doute ! c'était son titre en propre, dans la famille. — M. Sulte ajoute:—" C'est peut-être lui qu'on nommait également le chevalier de Beauharnais, et qui figure comme enseigne en pied, en Canada (1739)." C'est soit lui ou son fils, Claude.

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[1] D'Hozier, *Armorial de France*, registre V, pp. 75-93.

[2] M. Sulte s'était informé en partie dans *Ferland* et *Daniel*.

6° Guillaume de Beauharnais, chevalier de Beauville, servit 40 ans dans le corps de la marine; fut successivement gentilhomme garde de la marine, 1697; lieutenant d'infanterie au Canada, 1702;[1] capitaine d'une compagnie du détachement de la marine, en Canada, le 1er juin 1704; blessé d'un coup de fusil au bras dans un combat naval, où il se trouva en 1705. Enseigne de vaisseau, le 1er novembre 1705; aide-major des armées navales et du port de Rochefort, et capitaine d'une compagnie franche d'infanterie de la marine, le 20 avril 1711; lieutenant de vaisseau, 1711; chevalier de Saint-Louis, le 23 décembre 1711, reçu le 20 janvier 1724, (le 8 septembre 1723, il commandait la flute le *Chameau*); enfin, capitaine de vaisseau, le 10 mars 1734. Il finit ses jours à St-Domingue, l'an 1741.

7° Jeanne-Elisabeth, mariée à Michel Bégon, intendant du Canada.

8° Anne.

9° Catherine.

Claude de Beauharnais, chevalier de Beaumont, avons-nous dit, continue la descendance.

De son mariage à Rénée Hardouineau, il eut:

1° *François.*

2° *Claude.*

François fut gouverneur des îles de la Martinique, Guadeloupe (1756), etc. Il naquit à La Rochelle, le 8 février 1714. Le roi érigea sa terre de la Ferté-Aurain en marquisat, et François prit le titre de marquis de la Ferté-Beauharnais. C'était en récompense des services que cette famille avait rendus au roi.

Son union avec sa cousine germaine, Marie-Anne-Henriette Pyvart de Chastullé, date du 13 septembre 1751. Il en eut:

1° *François,* mort en bas âge.

2° Un autre *François,* né à La Rochelle, le 12 août 1756.

3° *Alexandre-François-Marie,* né à la Martinique, le 28 mai 1760.

Claude, fils de Claude de Beauharnais de Beaumont, naquit à Rochefort, le 16 janvier 1717. Il fut pendant quatre ans commandant de l'artillerie en Canada (1745). C'est lui qu'on rencontre aux environs du Détroit en 1747, sous le nom de chevalier de Beauharnais.

Ce Claude est le seul du nom, neveu de notre gouverneur, et, comme en 1729, il n'aurait eu que douze ans, il est impossible que ce soit lui qui obtint, à cette date, la seigneurie de Beauharnais, et qui fut en même temps lieutenant de vaisseau. C'était plutôt son père, qui portait le même nom.

Claude, le jeune, en récompense de ses services fut créé comte des Roches-Baritaud.

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[1] Il remplaçait M. de Sabrevois.

De son union à Marie-Anne-Françoise Mouchard, du 1er mars 1753, nous comptons:

1° *Claude,* né le 26 septembre 1756.

2° *Marie-Françoise,* née le 7 septembre 1757.

3° *Anne-Amédée,* né le 8 janvier 1760.

Alexandre-François-Marie, vicomte de Beauharnais, épousa Joséphine Tascher de la Pagerie, vers 1780, alors qu'elle avait à peine douze ans. Leur fils naquit en 1781. On connait le sort glorieux et triste de cette femme.

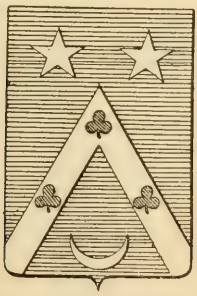
La famille de Beauharnais blasonne comme suit: *D'argent à une fasce de sable, surmontée de trois merlettes de même.*

Devise: *Autre ne sers.*

Le titre, par alliance, est tombé entre les mains d'une famille russe.

IX

Jacques et Antoine-Denis Raudot, huitième et neuvième intendants.



Cette famille est originaire d'Arnay-le-Duc, en Bourgogne. Ce village est tout près de Dijon, et sa population aujourd'hui ne dépasse pas quatre mille âmes.

Le premier des Raudots qui vint se fixer à la Côte d'Or, y arriva vers 1360. Son fils fut à la tête d'une fonderie de canons pour Charles le Téméraire, duc de Bourgogne, puis inspecteur de son artillerie.

C'est le 1er janvier 1705 que le roi appela à l'intendance du Canada, Jacques Raudot, et lui adjoignit en même temps, pour assistant, son fils Antoine-Denis, pour servir au cas de maladie ou autre empêchement du père, et surtout lorsque celui-ci serait absent et éloigné de Québec de plus de dix lieues. Ils avaient entrée, séance, voix et opinions délibératives, au Conseil Supérieur, avec cette particularité, cependant, que si leurs voix se trouvaient conformes elles ne pouvaient compter que pour une.

Jean Raudot, père de Jacques, possédait les seigneuries de Bazarne et du Coudray. Jean, par son mariage avec Marguerite Talon,[1] s'acquérait l'influence de cette famille, ainsi que celle des Phélypeaux, comtes de Pontchartrain, et d'autres, assez importantes.

Jacques naquit en 1647. Il passa successivement aux charges suivantes: conseiller au Parlement de Metz (1674), puis à la Cour des Aides, à Paris (26 mai 1678). Ce fut avant de venir au Canada. Il était considéré bon juge, à Paris, mais ses affaires étaient en mauvais état, et c'est peut-être dans l'espoir qu'il y pourrait remédier que ses parents lui firent avoir l'intendance du Canada.

Jacques Raudot était plein d'esprit, d'une conversation agréable et aisée, et parlait bien de toutes choses. Il possédait l'histoire de tous les pays, et s'entretenait familièrement avec tout le monde. Il aimait beaucoup la jeunesse, et lui procurait chez lui d'honnêtes plaisirs. Son divertissement ordinaire était un concert mêlé de voix et d'instruments.

Le fils, Antoine-Denis (né en 1679) avait d'abord été conseiller, puis inspecteur général de la marine à Dunkerque, avant d'être adjoint à son père. On avait bonne opinion de lui à la cour, car il parlait peu et paraissait sage.

Les deux intendants se partagèrent la besogne, et ils y allèrent de mains fermes, ce qui ne manqua pas de blesser quelques-uns de nos Canadiens, mais comme les deux fonctionnaires avaient bonne cause et comptaient de puissants protecteurs sur les marches du trône, leur triomphe s'assurait de suite.

La sollicitude des messieurs Raudot pour l'avancement de la Nouvelle-France fut réelle et leur fit concevoir des projets grands et nobles, détaillés et raisonnés avec une précision admirable et appuyés de preuves solides.

Ils s'intéressèrent fortement aussi au développement de l'agriculture, ainsi qu'à la police de Québec et de Montréal.

Jacques Raudot avait en Canada un autre fils qui s'appelait Jacques-Denis Raudot de Chalus, né en 1685. Il obtint pour lui, ainsi que pour son neveu Dusty, Sieur de Zély, une lieutenance (1707). Le 10 mai 1710, le monarque accorda à ce fils cadet la première compagnie vacante au Canada, mais il est probable que lorsque le père retourna en France, l'année suivante (1711), son fils dût le suivre.[2] Jacques

[1] Omer Talon, intendant de la maison et affaires de M. le duc de Beauport, était son frère. Denis Talon, avocat-général au Parlement de Paris, se trouvait être son neveu.

Le grand'père du Comte de Pontchartrain, ministre de la marine, avait épousé Marie Talon, cousine de Marguerite.

[2] En 1713, il reçoit un brevet d'enseigne de vaisseau. L'année suivante il se noie à l'île de Sable. Il était alors capitaine.

avait demandé au ministre de Pontchartrain d'être fait conseiller d'honneur en la Cour des Aides, mais le ministre lui manda que cela ne se pouvait et qu'il lui ferait comprendre à son retour que cette grâce lui serait absolument inutile dans son état. Il ajoutait qu'il discuterait avec lui ce qui pourrait mieux lui convenir. De Pontchartrain, à la rentrée de Jacques en France, ne trouva mieux que de le prendre comme l'un de ses principaux commis.

Il fut en outre conseiller de marine, sa nomination datant de 1709.

Il mourut en 1728, âgé de 81 ans.

Antoine-Denis, rappelé un an avant son père, fut nommé intendant-général des classes des matelots du royaume. Il fut en même temps premier commis de la maison du roi, et directeur de la compagnie des Indes. Il succéda à son père comme conseiller de marine, position qu'il conserva jusqu'à sa mort, en 1737.

Antoine ne laissa pas de postérité,[1] et il nous est impossible d'annoncer présentement si Jacques-Denis Raudot continua la descendance, ou si ce furent ses oncles, Jean-François et Louis-François; mais descendance il y a, puisque la famille existe encore de nos jours. Après la fin prématurée de M. Raudot de Chalus, en 1714, nous trouvons Jean Raudot, seigneur d'Orbigny, qui acheta une charge de secrétaire du roi. Il restait alors seul de cette famille autrefois si nombreuse. Il eut un fils: Auguste, maire d'Avallon et député de l'Yonne, de 1816 à 1832, année de son décès. Auguste avait trois fils: Jacques-Henry, Claude-Marie et François-Alphonse.

Quelques-uns de nos historiens connaissent la brochure de Claude-Marie Raudot, sur ses ancêtres: Jacques et Antoine-Denis; ils ont pu y cueillir beaucoup de renseignements sur ces "*deux intendants de la Nouvelle-France sous Louis XIV.*" Aujourd'hui nous avons pu donner d'autres détails supplémentaires, grâce à l'obligeance charmante du fils de François-Alphonse, M. Réné Raudot.

Messieurs Raudot ont pour armoiries: *D'azur au chevron d'argent, chargé de trois trèfles de sinople, et accompagné en chef de deux étoiles d'argent, et en pointe d'un croissant du même.* (Annuaire de la noblesse, 1873).

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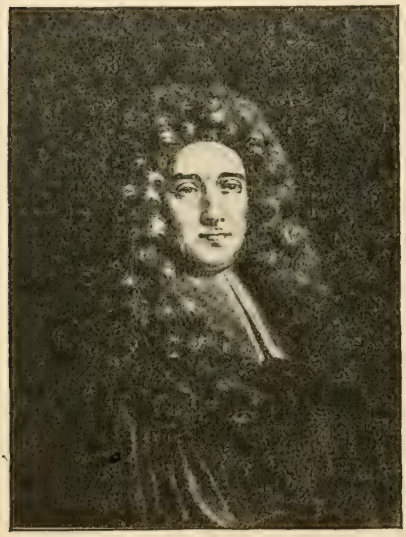
[1] La sœur d'Antoine, Marguerite-Françoise, a épousé, en 1705, Claude-Marie de Girard, marquis d'Espeuilles. Par cette union, la seigneurie de Bazarne, à 8 lieues d'Avallon, passa aux Messieurs Girard. M. le général marquis d'Espeuilles, auquel nous nous sommes adressés pour avoir, si possible, des informations et les portraits de nos deux intendants, s'est donné beaucoup de peine pour nous être agréable, mais ses recherches parmi ses papiers et même à la Bibliothèque Nationale n'ont rien produit à son regret, car M. le marquis s'intéresse à notre histoire; outre qu'il est parent de Messieurs Raudot, il est aussi arrière-petit-neveu du marquis de Montcalm.

X

Michel Bégon, dixième intendant.



La famille Bégon est noble et originaire de Blois, et fut l'une des plus considérables de ce pays, mais elle doit son principal lustre à Michel Bégon, troisième du nom, qui s'est rendu recommandable par son amour pour les Belles-Lettres et par son zèle pour tout ce qui regarde le bien public.

Ce personnage fut le père de Michel Bégon, intendant du Canada (1712-26). Il vit le jour à Blois, le 26 décembre 1638.[1] Sa première charge publique fut celle de garde-scel du présidial de sa ville natale, puis il passa à la présidence de ce tribunal, en 1665. A cette époque, parmi les fonctionnaires royaux, une nouvelle figure prenait un relief

[1] D'après *Colbert par Clément*, tome III, page 220, il est né en 1628, et cela s'accorderait mieux avec l'idée de son mariage en 1648.

brillant. Ce fut, Jean-Baptiste Colbert, le plus grand des ministres français. Michel (III) Bégon, dont la cousine, Marie Charon, avait épousé, en 1648, Colbert, devait bénéficier, cela se comprend, de cette alliance.

Grâce à la protection du ministre, son parent, il change de carrière, et le voilà bientôt (1677) trésorier de la marine, à Toulon d'abord, puis à Brest. Commissaire général de la marine en 1680. En 1681, il est nommé à l'intendance du Hâvre.[1] Depuis quelque temps déjà, Colbert avait songé à son cousin Michel pour l'envoyer au Canada, et les provisions étaient remplies de son nom, mais le ministre changea d'idée, pour lui donner l'intendance des îles françaises, en Amérique (1 mai 1682), et ce fut le beau-frère de Bégon, M. de Meulles, qui passa au Canada, au même titre.[2]

Aux Antilles, Michel III rétablit l'ordre et fit des règlements sages pour la justice et la police de cette colonie.

En 1685, il retourne en France, s'en allant à Marseilles, à l'intendance des galères. Enfin, on le voit occuper successivement la charge de conseiller d'honneur à Aix (1686), d'intendant de la marine à Toulon, à Rochefort (1688),[3] et à La Rochelle.

Pour terminer ces lignes sur Michel III, disons qu'il a acquis sa célébrité à cause de son cabinet de médailles, d'antiquités, d'estampes et de coquillages, recueillis dans les quatre parties du monde; par sa bibliothèque et pour avoir fourni à Perreault les matériaux pour l'*Histoire des hommes illustres de France.*[4]

Bégon mourut le 14 mars 1710, et fut enterré dans l'église des Capucins, à Rochefort.

C'est de cet homme illustre que naquit, vers 1674, Bégon (Michel IV), intendant du Canada, de 1712-1726.

De son mariage avec Madeleine Druillon, Michel III a laissé:

1° *Michel* (IV du nom).

2° *Scipion-Jérôme.*

3° *Claude-Michel.*

4° et 5° Deux filles religieuses.

6° *Madeleine*, mariée en 1686 à Joseph d'Arcussia, d'une ancienne noblesse de Provence.[5]

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[1] J. E. Roy, *Notes sur l'Intendant Bégon*, Bulletin des Recherches Historiques, vol. IV, p. 265.

[2] M. Dudouyt à Mgr de Laval, 26 mai 1682.

[3] Il était à Rochefort en 1698.

[4] *Bibaud*, je, Panthéon Canadien, p. 27.

[5] M. D'Arcussia mourut jeune, étant officier des galères du roi, lors du bombardement d'Alicante. Il laissa deux fils. (*Dict. LaChesnaye-des-Bois*, p. 703).

7° *Catherine*, mariée à Roland-Barrin de la Galissonnière, lieutenant général des armées du roi.[1]

8° *Agnès*, mariée à Pierre-Alexandre de Foyal de Donnery, gouverneur de Blois.

Prenons d'abord Michel IV, c'est le premier en liste, et c'est lui qui nous intéresse plus particulièrement. Nous reviendrons à Scipion et à Claude ensuite.

Michel Bégon, chevalier, seigneur de la Picardière, Marbelin, St-Sulpice, Pommeraye, de la Sistière, de Sérigny, de Meunes, etc., était inspecteur général de la marine et ordonnateur au département de Rochefort, depuis 1707, sinon plus tôt, lorsqu'il fut nommé, le 31 mars 1710, intendant de la justice, police et finances, au Canada, en remplacement de MM. Raudot. Il était aussi conseiller du roi en ses conseils et au Parlement de Metz, en Lorraine.

Le décès de son père, arrivé le 14 mars 1710, retarda son départ pour le Canada.

François de Beauharnais, qui avait été intendant du Canada quelques années auparavant, venait d'être appelé au poste de Rochefort (24 mars 1710). Bégon le rencontra, fit aussi la connaissance des autres membres de la famille de Beauharnais, et l'année suivante (1711), il épousa Jeanne-Elisabeth de Beauharnais, sœur des Beauharnais qui furent, l'un intendant, l'autre gouverneur de la Nouvelle-France. Cette union l'apparentait avec les Phélypeaux, comtes de Pontchartrain, alors ministres (1696-1715).[2]

Bégon partit de France en juillet, sur le *Héros*, commandé par son beau-frère, le lieutenant Beauharnais de Beaumont. It mit pied à terre à Québec en 1712; sa femme l'accompagnait. Son frère Claude-Michel avait aussi fait la traversée, car le roi venait de lui accorder l'expectative d'une compagnie au Canada, pour la première vacance.

Le 5 janvier 1713, le feu se déclara au palais de l'intendant, et telle fut la célérité des flammes, que Bégon et sa femme eurent peine à se sauver. Madame Bégon, suffoquée par la fumée dans sa chambre, fut obligée de briser les carreaux de sa fenêtre pour avoir de l'air pour respirer. Deux de ses femmes périrent dans cette conflagration. Brisset, le valet de Bégon, voulant sauver une partie de la garde-robe de son maître, périt aussi. Son secrétaire se sauva nu-pieds, vers la rivière, en face, et se gela tellement qu'il en mourut quelques jours après, à l'Hôtel-Dieu.

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[1] On a souvent donné ce M. de la Galissonnière comme l'administrateur de la Nouvelle-France; mais le premier était le père, l'autre le fils. (*Ignotus, La Presse*, Montréal, 8 mars, 1902, et *Can. Corr. Gen. F., vol. 93, p. 85*).

[2] Pour parenté entre Beauharnois et Phélypeaux, voir article sur François de Beauharnais.

Bégon perdit dans ce feu des effets évalués à trois mille livres, et 1500 livres en monnaie de carte.

Le palais fut ensuite reconstruit aux frais du roi sous la direction de Bégon.

Pour l'indemniser de ses pertes, le roi lui fit une gratification de trois mille livres, répétée plusieurs années de suite.[1]

Bégon, il semble, a voulu, dans les premières années de sa charge au Canada, jouer un peu le rôle que devait pratiquer en grand, plus tard, le triste sire: Bigot!

A la date du 17 juillet 1715, le ministre mandait au frère de l'intendant, à l'abbé Bégon, que:—"Il ne peut payer en argent les appointements de son frère, mais par des assignations et des rentes, s'il y consent.[2] Il ne peut rien faire de mieux, et la conduite de son frère au Canada ne mérite pas de faveurs. Il vient de toutes parts un concert de plaintes contre lui d'une gravité exceptionnelle. Il veut se rendre maître du commerce du Canada, ayant fait construire pour cette fin quatre vaisseaux à La Rochelle. Il *(Bégon)* a envoyé deux navires aux Iles, chargés de blé et de farine, alors qu'il défend l'exportation, causant par là une émeute à Québec. Il a fait sceller tous les bluteaux des particuliers afin d'être seul à faire des farines. Il a vendu des blés à 16 livres le minot qui n'aurient pas valu plus de 4, s'il ne s'en était pas rendu maître, et qu'il n'eût pas empêché tout le monde d'en acheter. Il a voulu contraindre les marchands à livrer au sieur Haymard, son homme de confiance, des farines à trente livres le baril, alors que par l'augmentation dont il était lui-même la cause, elles valaient 60 livres. Il se rend absolument maître du commerce du Canada, et les gens sont perdus sans ressource, si on ne met un terme à son avidité. S'il revient encore des plaintes aussi générales, il en informera le roi. Il espère qu'il s'appliquera à réparer tout le mal qu'il a fait."

Quatre jours auparavant, le ministre avait écrit à l'intendant dans le même sens. Il faut croire que cette admonition eut un bon effet, car il n'y eut plus de plaintes semblables formulées durant la balance du terme que servit Michel (IV) en Canada.

En 1724, M. Bégon reçoit l'intendance du Hâvre, en France.

Le chevalier Edmé-Nicolas Robert part pour relever Bégon de charge, mais il tombe malade en route, et meurt en mer.

En 1725, M. Guillaume de Chazelles est à son tour appelé à l'intendance du Canada, mais le vaisseau qui le porte, *le Chameau*, par une

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[1] Le ministre à Bégon, 16 juin 1716.

[2] D'après procuration datée à La Rochelle, 10 juillet, 1712, l'abbé Bégon s'occupait en France des intérêts de son ainé.

tempête, donne sur un récif, près de Louisbourg, et la perte est entière, corps et biens.

Ces deux événements déterminent Michel Bégon à demeurer encore quelque temps à Québec. Enfin, en novembre 1725, M. Claude-Thomas Dupuy est nommé pour le remplacer; il arrive en août 1726 à Québec.

Le dernier procès-verbal des séances du Conseil Souverain, signé par Bégon, comme intendant, est daté du 15 avril 1726. Il s'embarqua pour la France le 16 octobre de la même année.[1] Le 23 novembre suivant il mandait de Rochefort, au ministre, toute la joie qu'il éprouvait de revoir son pays après une absence de quatorze ans.

Le Havre-de-Grâce est dans la Normandie. Quel stage Bégon eut-il à faire à cet endroit comme intendant ? Je n'en sais rien, mais en 1737, et probablement avant, il était intendant de justice, police et finances de la marine, au département de Normandie, avec résidence à Rouen, tel qu'il appert au contrat de mariage de sa fille: Jeanne-Elisabeth, avec M. de Lorgeril.

De son alliance avec Jeanne-Elisabeth de Beauharnais, Michel (IV) Bégon, eut, selon le *Dictionnaire Généalogique* de Mgr Tanguay:

1° *Michel*, baptisé le 10 mai 1713, à Québec. Il vécut à peine deux années (15 mars 1715);

2° *Un enfant* né et décédé le même jour, 13 septembre 1714;

3° *Jeanne-Elisabeth*, née le 27 août 1715, baptisée le 14 mars 1717, à Québec, dans la chapelle du Palais. Parrain: messire François Bégon, chevalier, conseiller du roi, grand'maître des Eaux et Forêts de France, département de Blois et Berry, en vertu de sa procuration passée au sieur Jean Martel, seigneur de la rivière St-Jean, Acadie. Elle épouse le 22 février 1737, Louis-François-Nicolas de Lorgeril, seigneur de Lorgeril et de Chalonge, etc. Elle mourut en 1739, laissant une fille qui devint religieuse. Lorgeril se remaria en 1740, avec Louise-Jeanne de Saint-Germain.

4° *Michel* (V) né le 22 février 1717, baptisé le 28 de ce mois, par Mgr de St-Valier, et filleul de M. de Vaudreuil, gouverneur. Nous reparlerons de cet enfant plus loin.

5° *Marie-Madeleine*, baptisée le 8 septembre 1718.

6° *Catherine*, le 25 août 1719.

7° *François-Louis*, le 23 février 1723, et inhumé deux ans plus tard, le 1er mai 1725, dans l'église de Québec.

8° *Un dernier enfant*, né et mort le même jour, 19 mars 1728.

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[1] Extrait du *Journal des Jésuites*, 1710-1759. Voir l'*Abeille*, vol. XI. 1878. janvier, 19.

L'intendant Bégon avait acheté le fief de Grand-Pré, situé à la Canardière. Il y fit bâtir une tannerie et des moulins. Il mourut en 1740.

Scipion-Jérôme, le deuxième fils de Michel Bégon et de Madeleine Druillon, né à Brest, en 1681, mort le 28 décembre 1753;[1] docteur en théologie en 1708; abbé de St-Germain-de-Fleix en 1713; vicaire-général de l'évêque de Beauvais; conseiller du roi en son Conseil d'Etat; évêque-comte de Toul; prince du Saint-Empire.

Claude-Michel Bégon, le troisième fils de Michel III, d'abord enseigne des vaisseaux du roi à Rochefort; lieutenant en 1714; capitaine de Compiègne, et obtint la Croix de St-Louis, en juillet 1718.

Il fut gouverneur des Trois-Rivières.

Claude-Michel naquit en 1683 et mourut à Montréal, le 1er mai 1748.

Le 19 décembre 1718, il avait épousé à Montréal, Marie-Elisabeth Rocbert,[2] fille d'Etienne Rocbert, sieur de la Mirandière, lieutenant et ingénieur, puis capitaine des troupes.

Tanguay leur donne:—

1° *Marie-Catherine-Elisabeth,* baptisée le 28 octobre 1719. Mariée le 17 novembre 1737, à Montréal, à Honoré de Villebois, sieur de la Rouvillère, conseiller du roi, etc. Elle fut inhumée à Montréal, le 21 septembre 1740.

2° *Marie-Louise-Geneviève,* baptisée le 4 juin 1721, sépulture le 3 janvier 1722.

3° *Claude,* baptisé 6 juin 1724.[3]

M. J.-Edmond Roy, dans son essai sur *Bégon,* publié dans le *Bulletin des Recherches Historiques,* de Lévis, vers la fin de son article, disait: "que l'évêque-comte de Toul céda la collection d'étampes, médailles, etc., du collectionneur Michel Bégon, à son *neveu, M. Bégon, conseiller honoraire au Parlement de Metz, et intendant de la marine,* alors en résidence à Paris," et il posait la question, qu'il ne pouvait résoudre pour le quart d'heure: "Ce neveu était-il le fils de l'ancien intendant ou bien du gouverneur des Trois-Rivières?"

Nous répondons:—"Le fils de l'intendant," et nous ajouterons que *Michel* (c'était aussi un *Michel*) qui continue la descendance, fut intendant de la marine, à Dunkerque. Il prit pour femme, le 3 juin 1743, Anne-Françoise de Pernot, morte le 4 août 1745, dont:

Michel (VI) né le 28 juillet 1745—mort en avril 1747.

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[1] D'après le *Dictionnaire de la noblesse,* par De-la-Chesnaye-Des-Bois et Badier, Scipion-Jérôme avait 77 ans à sa mort.

[2] Elle retourne en France, en 1749, avec M. de la Galissonnière, administrateur du Canada, neveu de feu son mari.

[3] Il est garde du pavillon à Brest, en 1749, à bord de la *Diane.*

La fameuse collection de monnaies, étampes, etc., fut offerte à la bibliothèque du roi par le neveu de Scipion-Jérôme: Michel V, fils de l'intendant du Canada.

Une cousine de notre intendant épousa, le 29 novembre 1718, Joseph-Charles de Vimeur de Rochambeau.

Il y eut deux ou trois branches ou maisons connues sous le nom de Bégon: Bégon de la Rozière, Rouxière, etc., et, après examen de leur généalogie, etc., nous sommes portés à croire que ces branches étaient du même tronc.

Les Bégons blasonnent: "*d'azur au chevron accompagné en chef de deux roses et en pointe d'un lion, le tout d'or*"

XI

Edmé-Nicolas Robert, onzième intendant.

Le 22 février 1724, Edmé-Nicolas Robert, chevalier, conseiller du roi, en ses conseils, et au Grand Conseil, fut nommé intendant en remplacement de M. Bégon.

Le chevalier était issu de la famille Robert, originaire de l'Orléanais et de Paris, dont les chefs eurent qualité de seigneurs de Villetaneuse, de la Fortelle et de Pesselières.[1]

Antoine Robert, anobli en 1481 par Louis XI, est le premier degré généalogique enregistré par le juge d'armes de France. Il finit à Amboise, mais il eut son épitaphe posée au cinquième pillier de l'église St-Paul, à Orléans.

Il eut postérité: c'est la branche de Villetaneuse. Louis Robert, que nous donnons comme premier intendant du Canada, était seigneur de la Fortelle; il n'eut que deux filles, bien mariées, dont une l'apparenta à Colbert.

Le chevalier Edmé-Nicolas appartenait à la branche cadette des Robert, de Pesselières. Vers 1716-18, il occupait une charge royale au port de La Rochelle.

Tous les membres de cette famille ont été fonctionnaires publics, et il n'y a jamais eu de plaintes formulées contre eux durant leur terme d'office.

D'après l'inventaire des effets, que le chevalier Robert emportait avec lui au Canada, on constate que c'était un homme ayant assez d'aisance, et la composition de sa bibliothèque nous donne une opinion agréable de son érudition.

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[1] D'Hozier, *Armorial Général*, Registre III.

Le 18 juillet 1724, ses préparatifs de départ terminés, il fit ses adieux aux ministres. Le 24, il s'embarquait à La Rochelle sur *le Chameau*, avec sa femme, Marie-Anne Picard de Mauny,[1] et son fils unique, Edmé-Antoine, âgé de onze ans. Son secrétaire, M. de Mousseau, et plusieurs domestiques l'accompagnaient. Il avait fait embarquer plus de *cent cinquante ballots*[2] d'effets, comprenant tous ses meubles, sa garde-robe et sa bibliothèque.

Depuis quelque temps M. Robert ne se sentait pas bien: pas assez mal cependant pour différer son voyage, et il s'embarqua, mais le soir du départ du navire, il empira et rendit l'âme.

Le lendemain, son corps fut jeté à la mer, le vaisseau étant encore en vue des côtes.

Madame Robert soutint cette affliction avec beaucoup de vertu et de force d'esprit. Madame de Vaudreuil, qui était à bord, fit tout ce qu'elle put pour adoucir les peines de la malheureuse veuve et la consoler. Rendue à Québec, la femme du gouverneur manda au ministre cette nouvelle et le pria d'essayer d'obtenir pour madame Robert une pension considérable.[3]

A Québec, madame Robert se retira à l'Hôtel-Dieu, refusant un appartement au château, que M. de Vaudreuil voulait lui faire accepter.

Le Conseil Souverain, par arrêt du 14 octobre, ordonna un service à la cathédrale pour le repos de l'âme de feu le chevalier Robert.

Afin de pouvoir faire l'inventaire des effets de l'ex-intendant, Bégon nomma le marquis de Vaudreuil, le commissaire-ordonnateur d'Aigremont, le procureur-général Collet, les conseillers Sarrazin, de Lino, de Lotbinière et Lanouiller, pour élire un tuteur à Antoine, fils mineur du chevalier.

Madame Robert fut choisie tutrice, et M. Collet, subrogé-tuteur. L'inventaire se fit le 16 octobre. Madame Robert et son fils retournèrent en France, aux premiers jours de novembre, par *le Chameau*.

Les armes du seigneur de Pesselières sont les mêmes que celles de la Fortelle: *D'azur à trois pattes de griffon d'or, posées deux et une.*

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[1] D'Hozier place les Mauny en l'Orléanais et à Paris, tout comme les Robert.

[2] Frontenac n'en emporta que 18, lorsqu'il vint à Québec.

[3] On avait déjà accordé 3,000 livres à DuChesneau pour couvrir ses frais de déplacement, ce qui motivait la supplique de madame de Vaudreuil.

XII

Guillaume de Chazelles, douzième intendant.

Le 2 novembre 1724, M. Bégon remerciait le ministre de l'avoir nommé intendant du Havre.

M. de Chazelles vint le remplacer. Il s'embarqua, probablement à Rochefort, en juillet 1725, sur la flute *le Chameau.*

Le vaisseau était un peu en dehors de sa course, lorsqu'il arriva près des côtes de l'Acadie, la nuit du 27 au 28 août, lorsqu'un coup de vent du sud-est, très violent, le jeta sur les récifs de l'île Porte-Nové, et le naufrage fut complet. Des pêcheurs vivant à Lorembec, vis-à-vis l'île, déclarèrent le lendemain n'avoir jamais vu tempête aussi effrayante. L'île est située à neuf milles environ de Louisbourg. Le lendemain du sinistre, la mer jeta sur le rivage, au Petit Lorembec, les cadavres des passagers et de l'équipage du *Chameau.* Au nombre des premiers ramassés, il y avait M. de Chazelles; M. Chaviteau, pilote du vaisseau, et l'un des plus pratiques de ces mers, au dire de Montcalm;[1] M. La Gesse, fils de Ramezay. Ces trois furent inhumés au Petit Lorembec. La commission de l'intendant ainsi que d'autres papiers vinrent à terre, et furent renvoyés en France.

Le gouverneur de Louisbourg dépêcha aussitôt un petit bateau acadien à M. de Beauharnais pour l'informer du triste événement.

* * *

Il existait dans la Haute-Auvergne, jadis, deux fiefs importants, du nom de Chazelles: l'un, dans la paroisse d'Auriac, entre Bresle et Massiac, possédé de temps immémorial par la maison Chavagnac; l'autre est un chef-lieu de commune du canton de Ruines, près de Saint-Flour, et c'est vraisemblablement ce dernier qui a donné son nom à la famille de Chazelles, de noblesse d'ancienne extraction, qui fait l'objet de cette notice, qui est connue depuis Gérard de Chazelles, vivant en 1266, et Pons de Chazelles, damoiseau, en 1286.

Guillaume de Chazelles forme le huitième chaînon dans la filiation. Il était écuyer, conseiller du roi, lieutenant et magistrat en la

[1] Journal de Montcalm, p. 46.

viguerie royale de Roquemaure. Il épousa, le 26 octobre 1660, Jeanne de Zanobis, dont il eut:

1° *Jean-Pierre;*

2° *Henri,* mort en 1725, intendant du Canada.[1]

3° *François;*

4° *Jean;*

5° *Guillaume,* qui fut appelé à l'intendance du Canada, et périt en revenant en France,[2] sur le vaisseau du roi, *le Chameau.*

6° *Jeanne.*[3]

Les Chazelles étaient d'Auvergne et de Languedoc, comtes de Chazelles et de Chusclan; barons de Lunac; seigneurs de la Boissière, Luc, Bagnet, Poujols, Beauregard, Aillet, Roche-Salesse, Courdes, Montirat, Rieux, etc.....

Leurs armes sont décrites: *D'azur à une tête de léopard d'or, lampassée de gueules; au chef cousu de gueules, chargé à dextre d'un croissant d'argent, et à senestre, d'une étoile du même.*

Supports: *Deux lions.*

Couronne: *de comte.*

Devise: *Toujours prêt à servir, et à s'effacer quand il a servi.*

XIII

Claude-Thomas DuPuy, treizième intendant.

Du Puy mit pied à terre, à Québec, avec le marquis de Beauharnais, le 28 d'août 1726. Son brevet d'intendant est signé du 23 novembre 1725. Son premier acte officiel au conseil est en date du 31 décembre.

[1] Le généalogiste fait erreur ici. C'est Guillaume de Chazelles qui a été intendant; c'était mon opinion dès le jour où j'écrivis cet article, mais je suis confirmé par une lettre de M. le baron Max de Finfe St-Pierremont, marié à une descendante des Chazelles: mademoiselle de Cacqueray-Valolive.

[2] Il y a évidemment une tradition dans la famille que l'intendant est mort en revenant en France. C'est ce que me dit mon aimable correspondant: mais la correspondance officielle du temps établit le contraire.

[3] *Nobiliaire Universel,* Vte de Magny, vol. II, p. 68. 1855.

Claude-Thomas Du Puy, chevalier, était avocat au Châtelet de Paris; avocat général au Grand Conseil, conseiller du roi en ses Conseils d'Etat et privé, maître des requêtes[1] en titre, et ensuite honoraire avant d'être transféré à la Nouvelle-France.

Sa commission est enregistrée à Québec le 2 septembre 1726.

On peut bien dire, sans crainte d'être désapprouvé, que cet officier a été, de tous ceux de son rang, le plus prétentieux, orgueilleux, et le moins raisonnable connu dans notre histoire. Il suffit de lire l'excellent article d'*Ignotus*, dans *La Presse*, (Montréal) 19 octobre 1901, pour s'en convaincre. Lisez par exemple l'extrait qui suit:—" C'était " pourtant un homme intelligent, instruit, lettré, profondément versé " dans la science du droit, doué d'une perception nette et rapide, d'une " élocution nerveuse et d'une rare facilité de plume. Mais ses talents " étaient déplorablement gâtés par son caractère. En effet, il était " autoritaire, opiniâtre, arrogant, entiché de sa personne, féru de l'idée " qu'il pouvait exceller en tout, violent et excessif, et capable de pousser " ses ressentiments jusqu'aux plus fâcheuses extrémités." Il fut bientôt en guerre avec quasi tout le monde: le gouverneur, l'évêque, et un certain nombre de prêtres.

Le 28 mai 1728, madame Du Puy, venue de France avec son mari et son fils, jésuite, retourna en France. Elle précédait son mari de quelques mois. En effet, rappelé par son souverain, il prit passage pour la France, le 1er octobre, laissant ses affaires privées, dans un état passablement embrouillé, aux soins de son fils, le jésuite.

La famille est originaire de la Touraine, et est alliée aux Fleury, parents avec M. de Meulles; aux Voyer d'Argenson; de la Trémouille, etc., qui à leur tour comptaient comme De Meulles: parenté avec Colbert et Bégon; les Voyer d'Argenson: avec les Lusignan, Alogny de la Groie, et de combien d'autres de ce coin de France, dont les noms sont familiers aux lecteurs de notre histoire.

La maison est assez ancienne; nous en avons relevé des traces jusqu'à 1330, lorsque Guillaume de Fleury épousa Jeanne Du Puy.

Les armes enregistrées sont: *D'or à un lion d'azur, armé, couronné, lampassé de gueules.*

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[1] Les maîtres de requêtes avaient une juridiction spéciale et sans appel, sur tous les officiers de la maison du roi. C'est ce que l'on appelait les *requestes de l'hostel.*

XIV

Gilles Hocquart, quatorzième intendant.

La famille Hocquart est originaire de la Champagne. Le Réthelois fut le berceau de cette illustre maison. Le 4 janvier 1536, elle prouve sa noblesse d'ancienne extraction devant les élus de Réthel.

D'Hozier, juge d'armes de France, nous dit que le nom de cette famille est indifféremment orthographié dans les actes qu'il a examiné: Hocar, Hocart, Hoccard, Hoccart, Hocquard, Hocquart et Hoquart. Cependant, il nous assure que les seigneurs de Montfermeil et de Coubron, quatrième branche des Hocart, établie à Paris, se sont fixés depuis 1644, à orthographier leur nom: *Hocquart.*

La famille était ainsi divisée:

I. Hocart, en Champagne.

II. Hocart, (Claude), de Ste-Ménéhould.

III. Hocart, (François), seigneur de Felcourt.

IV. Hocquart (Jean-Hyacinthe), chevalier, seigneur d'Essenlis et de Muscourt.

V. Hocart, (Etienne), écuyer, sieur de la Motte.

Gilles Hocquart descendait de la quatrième branche. Son père, seigneur d'Essenlis et de Muscourt fut conseiller du roi en ses conseils, et intendant de justice, police et finances, de la marine, au département de Toulon, par provisions du 30 avril 1716. Il mourut à Paris, le 17 octobre 1723, à l'âge de 74 ans. Il eut quatorze enfants, dont cinq moururent en bas âge.

Gilles était le troisième fils de Jean-Hyacinthe.[1] Il est qualifié de chevalier. Il fut d'abord commissaire de la marine et obtint du roi, le 8 mars 1729, une commission en qualité de commissaire-général de la marine et d'ordonnateur en la Nouvelle-France pour faire, au défaut de l'intendant, les fonctions qu'il serait en droit d'y faire lui-même. Il arriva à Québec vers la fin d'août 1729, et se présenta au Conseil Souverain le 6 septembre suivant, pour faire enregistrer sa commission, afin d'agir comme intendant. Le 21 février 1731, il fut nommé à Versailles, intendant de la Nouvelle-France, etc.; ce nouveau document fut présenté au Conseil le 20 août de cette année.

Sous son administration, et malgré les embarras financiers de la mère-patrie, la colonie sembla prospérer.

Hocquart fut remplacé par Bigot. De retour en France, nous le retrouvons aussitôt intendant de Brest, (le 1er avril 1749), et plus tard, conseiller d'Etat (29 décembre 1753).

En 1756, le général de Montcalm s'embarqua de France pour diriger les opérations militaires en Canada, contre les Anglais. Il rapporte dans son *Journal* (page 30), qu'à son passage à Brest, il y fut très bien reçu par M. le comte Du Guay, chef d'escadre qui commande la marine, et par M. Hocquart, intendant.. .. "Pour M. et madame "Hocquart, c'est un couple bien assorti; ce sont d'honnêtes gens, ver-"tueux, bien intentionnés, tenant une bonne maison. Aussi, M. Hoc-"quart a-t-il été vingt ans intendant en Canada, sans avoir augmenté "sa fortune, contre l'ordinaire des intendants des colonies qui n'y font "que de trop grands profits au dépens de la colonie."

Hocquart épousa, par contrat du 23 août 1750, demoiselle Anne-Catherine de la Lande, fille de Claude de la Lande, comte de Câlan, chevalier de l'ordre royal et militaire de Saint-Louis.

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[1] Jean, aïeul de Hyacinthe, épousa une demoiselle Colbert, fille du cousin du ministre; celui-ci assista au mariage. Jean-Hyacinthe prit pour femme, le 10 décembre 1681, Marie-Françoise Michelet-du-Cosnier, fille de François et de Marie Talon.

Hocquart de Senlis, fils de Jean, devint le premier commis de Colbert.

La sœur de Gilles se maria à Claude-François Le Tellier, brigadier-général des armées du roi.

Au mois d'avril 1755, trois mille hommes formant six bataillons, et deux cents officiers avaient été embarqués à Brest, à destination de Québec et Louisbourg. L'escadre portant ces troupes comptait douze vaisseaux et deux frégates. Partie le 3 mai des côtes de France, elle passa aux abords de Terreneuve, à peu de distance de la flotte Anglaise, dont elle ne fut pas aperçue au milieu des brouillards, et gagna Québec sans encombre. Seuls, trois navires: l'*Alcide*, le *Lys* et le *Dauphin Royal,* qui s'étaient écartés du gros de la flotte, donnèrent, le 8 juin, dans l'escadre de l'amiral Boscawen, composée de onze vaisseaux de ligne et de plusieurs frégates.

M. de Choiseul rapporte que M. Hocquart, qui commandait l'*Alcide,* étant à portée de la voix du *Dunkerque,* de soixante canons, fit crier en anglais: "*Sommes-nous en paix ou en guerre?*" On lui répondit: "*Nous n'entendons point.*" M. Hocquart répéta lui-même la question en Français, le capitaine Anglais répondit par deux fois: "*La paix! la paix!*" On connait ce qui s'ensuivit; malgré que le capitaine anglais eut répondu: "*En paix!*" l'*Alcide* et le *Lys* n'en furent pas moins capturés après combat.

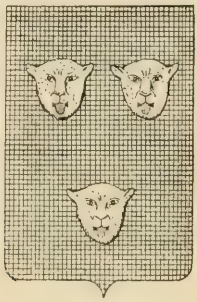
Ce M. Hocquart (Toussaint), commandant l'*Alcide,* était frère de Gilles. Il fut chef d'escadre en 1761. Il naquit à Nantes et fut baptisé le 29 octobre 1700. Jean-Hyacinthe Hocquart de Montfermeil, neveu de Gilles et de Toussaint, fut tué durant l'action ci-haut mentionnée. Ce M. de Choiseul avait épousé une Hocquart.

Blason: *De gueules à trois roses d'argent, posées deux et une.*

Les Hocquart de Turtôt, de nos jours, continuent la descendance.

XV

Francois Bigot, quinzième intendant.



François Bigot est né à Bordeaux le 30 janvier 1703. Son père, Louis-Amable Bigot, était conseilleur du roi au Parlement. La mère de François appartenait aux Lombard, famille très puissante dans la Guyenne, d'où les ancêtres de notre *héros* tirent aussi leur origine.

Bigot avait des influences éminentes à la cour; cela se comprend bien lorsque l'on sait qu'il était cousin du marquis de Puysieux et du maréchal D'Estrées.[1] Marie-Louise Bigot, fille d'Antoine, auditeur des comptes de Paris, était mariée (1697) au fils du comte de Sillery et de Catherine de La Rochefoucauld. Le fils de Marie-Louise: le marquis de Puysieux, fut ministre des affaires étrangères, secrétaire d'Etat, et membre du conseil de marine. Ce ministre eut une fille unique, qui, par dispense, épousa en 1744, Louis-Charles-César Le Tellier, comte puis maréchal d'Estrées. C'est le même que celui mentionné un peu plus haut.

Le 9 septembre 1739, Bigot arrive à Louisbourg et prend charge du poste que le ministre vient de lui confier. Sa commission comporte les titres suivants: Ordonnateur à l'île Royale, chef du Conseil Supérieur, et sub-délégué de l'intendant.

En 1742, il fait le tour de l'île pour en visiter les ports. En 1744, Bigot fait déjà des affaires à son compte. On avait appris à Louisbourg la déclaration de la guerre entre la France et l'Angleterre, plusieurs jours avant qu'elle parvint à Boston; les marchands armèrent aussitôt des corsaires, et Bigot, pour sa part, eut plusieurs bâtiments en course. Cependant, il ne fit pas d'argent, cette fois-là. Voyant cela, il opta pour un autre plan, qui lui servit d'apprentissage pour plus tard, alors

[1] *Dict. Généalogique.—La Chesnaye-Des-Bois.*—Mais, Guénin, *La Nouvelle-France*, vol. II, p. 197; Garneau, *Hist. du Canada*, vol. II, p. 263; *Montcalm au maréchal de Belle-Isle*, 12 avril 1759, le disent proche parent de Puysieux et d'Estrées, sans spécifier le degré.

qu'il serait intendant de la Nouvelle-France. Dans les derniers jours d'octobre 1744, la garnison de Louisbourg se révolta. Faute d'ouvriers, les soldats étaient chargés d'achever les fortifications. Il parait que l'on avait négligé de payer le supplément de solde que ce travail valait. Les soldats se plaignirent; ils murmurèrent sans être écoutés. Ils résolurent de se faire justice, et se révoltèrent ouvertement. Les séditieux se choisirent de nouveaux officiers, s'emparèrent des casernes, établirent des corps de gardes, posèrent des sentinelles aux magasins du roi et chez Bigot, duquel ils demandèrent la caisse militaire, sans oser la prendre, cependant. Ils formulèrent après cela des plaintes très-vives contre les officiers et Bigot qu'ils accusèrent de retenir une partie de *leur paye,* de *leur habillement* et *même* de *leur subsistance,* Bigot se hâta de les satisfaire sur quelques points, et tout l'hiver, il employa cette tactique quand ils devenaient trop menaçants.[1] Fit-il autrement, à Québec, quand il eut le malheur d'y être ?

Après la prise de Louisbourg, en 1745, il retourna en France, mais telle était son influence, en cour, qu'il obtint ses appointements pour 1746 et 1747, tout comme s'il eut été en fonctions à l'île Royale. Puis, il s'en va faire un tour à Bordeaux et aux eaux de Bagnières, mais en partant pour ces deux endroits, il offre ses services au ministre, s'il a besoin de lui pour le Canada.

En 1746 Bigot reçoit l'intendance de la flotte, placée sous les ordres du duc D'Anville, destinée à reconquérir l'île Royale. C'est Maurepas, ministre de la marine, qui le protège, et il devait y avoir certainement parenté entre les deux, car Bigot parle dans sa correspondance avec trop d'assurance à son égard pour les faveurs qu'il en peut tirer; nous ne comprenons pas que le ministre soit porté à tel point envers Bigot, à moins de quelque affinité consanguine.

La commission d'intendant à la Nouvelle-France, de Bigot, est du 1er janvier 1748, et fut enregistrée à Québec le 2 septembre. Il arriva à Québec, par le *Zéphir,* le 26 août 1748.

En 1748-49 il alla faire une promenade jusqu'à Louisbourg pour voir ce qu'il y aurait à faire afin de nuire aux Anglais.

En octobre 1749, Bigot intercède auprès du nouveau ministre de la marine, Rouillé, comte de Joüy, pour son frère, enseigne de vaisseau. Il se plaint de ce que ce frère a été laissé trop longtemps sans promotion, et il ajoute qu'en 1740, quand des promotions ont été distribuées, *il est persuadé que s'il eut été en France alors on n'aurait pas oublié son parent.* Il demandait aussi des faveurs pour son neveu Reynack,[2] garde de la marine, à Brest, alors âgé de 25 ans, et pour son cousin

[1] Garneau, *Hist. du Canada,* vol. II, p. 170.

[2] Fils de la sœur de François Bigot.

germain, M. Lombard, dont le père a servi au Parlement de Bordeaux. Bigot dépeint son cousin en disant *qu'il avait de l'esprit et serait propre un jour à tout ce qu'on voudrait.* Il écrivait cela à l'un des ministres du roi, sans se gêner, ce qui fait bien voir où les fonctionnaires du temps en étaient. On a beaucoup blâmé Bigot pour le commerce scandaleux qu'il a pratiqué en Canada, mais il avait de si beaux modèles à copier dans la mère-patrie, que nous ne lui en tiendrions pas rigueur autant, s'il se fut agit d'un autre pays que le nôtre.

Il réprésente au ministre, (1749) qu'il a beaucoup perdu par la prise de Louisbourg, que ses déplacements lui coûtent cher, et il voudrait avoir une indemnité. Il profite aussi de l'occasion pour demander une augmentation dans ses appointements, disant qu'il est déjà en avance sur sa paye d'un an, à cause du train de sa maison, qui doit faire autant que celle du gouverneur, car les officiers et les habitants en attendent autant.

En 1750, Bigot s'est mis à l'aise; il veut s'entourer d'amis, de congénères, afin de pratiquer en grand son commerce de vol et de péculat. Il supplie le ministre de lui envoyer à Québec le sieur Vergor du Chambon, de l'île Royale; il veut avoir comme premier commis, au Détroit, le sieur Landriève, qui est en France.

En 1754, l'administration de Bigot n'avait pas été populaire. On lui reprochait d'avoir trop favorisé ses amis, d'avoir soutenu trop énergiquement ceux qui avait accepté sa confiance, mais qui n'étaient pas assez honnêtes gens. Dans ces circonstances il crut bon de se montrer à la cour pour dissiper les soupçons qui auraient pu s'élever contre lui, et se fortifier pour l'avenir. Varin, une autre de ses créatures, le remplaça durant son absence.

Le gouverneur même faisait le jeu de Bigot. On a été jusqu'à le soupçonner et l'accuser, mais il fut trouvé que M. de Vaudreuil n'avait pas trempé dans les machinations malhonnêtes de l'intendant. Le 28 octobre 1755, le gouverneur mande au ministre qu'il est nécessaire de laisser M. Bigot en Canada; qu'on pourrait difficilement lui trouver un successeur.

En 1757 les abus étaient déjà énormes, et l'année d'après, les plaintes, les accusations se firent plus pressantes vers l'Europe. Il faut lire les lettres de Montcalm à ce sujet. On saisit bien les nuances qu'il met dans sa correspondance, et lorsque, outré de ce qui se passe sous ses yeux, et qu'il ne peut se contenir plus longtemps, il emploi un chiffre secret.

Et le ministre (Berryer) dans sa dépêche du 19 janvier 1759, avertit Bigot que la fortune de ses adhérents, de ses créatures rend son

administration suspecte. Plus tard (29 août) Berryer l'accuse de manque d'ordre et d'économie, ainsi que de péculat.

Que faisait Bigot de tout cet argent qu'il acquérait ainsi ? Il le dépensait follement, justifiant le proverbe: Bien mal acquis, etc. Durant le carnaval de 1758, il perdit au jeu plus de 200,000 livres.

Moins de deux ans après, la colonie succombait aux attaques incessantes des troupes de l'Angleterre. Dans cette ruine, l'intendant pensait sans doute enfouir toute trace de ses ténébreuses spéculations. Mais à son retour en France, il fut incarcéré dans la Bastille et y séjourna onze mois, pendant qu'on lui faisait son procès. Lorsqu'il en sortit, ce fut pour prendre le chemin de l'exil, car il était banni de France, pour toujours, et ses biens confisqués.

Des contemporains de l'époque nous ont laissé le portrait physique et moral de Bigot.

Il était petit de taille, bien fait, délicat, mais il avait le visage laid et couvert de boutons. Il aimait le jeu, le faste, et les femmes. Il était haut, dur, et de difficile abord pour ceux qui lui déplaisaient; très judicieux dans les affaires qui ne heurtaient pas ses propres intérêts, et fort laconique dans ses réponses.

C'était un homme aimable, dit Montcalm.

Bigot blasonnait: *De sable à trois têtes de léopard d'or.*

IV.—*Mouvement intellectuel chez les Canadiens-français depuis 1900.*

Par l'honorable PASCAL POIRIER.

(Lu le 19 mai 1903.)

Il est décidément plus aisé de faire un règlement que de le suivre.

Les statuts de notre Société prescrivent au président de chaque section " de préparer pour la réunion annuelle un discours sur les matières relevant de sa section ", et je constate que bien peu d'entre ceux qui m'ont précédé ont satisfait à cette obligation de leur charge.

Je ne dis pas ceci pour trouver en faute les présidents de la section française: je constate seulement que nous ne portons peut-être pas un intérêt suffisant à notre Société Royale.

Notre action sur les écrivains de notre pays est nulle, ou à peu près; nous ne donnons aucune orientation aux lettres canadiennes; comme corps réputé d'élite, nous ne dirigeons en aucune façon le mouvement intellectuel canadien. L'âme canadienne flotte à côté de nous, sans être sollicitée par le faible sillage que nous traçons.

Ne vous semble-t-il pas, messieurs, que le marquis de Lorne, en fondant la Société Royale; que notre gouvernement, en la dotant, aient eu la pensée de faire autre chose qu'une synagogue stérile? N'avons-nous pas un rôle à remplir dans le drame intense qui se joue, au Canada, entre les différentes races, et dont le dénouement final sera la disparition de la nationalité française, ou la fondation d'une France nouvelle en Amérique ?

Comme Français, comme catholiques, notre place est parmi les Latins. Notre mission évidente sur ce continent est d'y répandre les arts, la haute culture intellectuelle, la civilisation, l'âme splendide de la France. Il faut que nous tenions haut, en Amérique, le flambeau dont la Gaule, depuis Charlemagne, a illuminé l'Europe. Notre place est au premier rang, en plein soleil, en pleine lumière. Relégués au second, nous périrons. Etre les premiers, au Canada, ou cesser d'être, telle est notre inéluctable destinée.

Or le nombre nous échappe. La majorité numérique n'est plus à nous. Nous formons bien encore aujourd'hui le tiers de la population totale du Canada; mais au train où nous arrive l'immigration mondiale, nous n'en serons pas le quart dans vingt ans, et le cinquième dans quarante ans.

Déjà nous avons à peu près perdu le Manitoba, où nous devrions être, où il nous eut été possible de rester, la majorité.

Les Acadiens se maintiennent à grande peine, dans les provinces maritimes, livrés qu'ils sont à une hiérarchie hostile et contrariés par

elle dans les efforts légitimes qu'ils font pour demeurer Français, et, par là même, catholiques.

Aux Etats-Unis, les nôtres constituent une forte avant-garde ; mais réussiront-ils à faire plus qu'arrêter le flot envahisseur de l'américanisme anglais? Seront-ils autre chose que la "levée" qui barre le torrent? Se maintiendront-ils par leur seul effort?

Il n'y a que la province de Québec où nous soyons numériquement les plus forts, où nous sommes les maîtres, où nous nous sentons sûrs de nous-mêmes.

C'est donc autour de la province de Québec que nous devons nous grouper, comme autour d'un foyer réchauffant et lumineux. Comme Athènes dans la Confédération hellénique, la province de Québec doit être la première dans la Confédération canadienne, par les lettres, les arts, les sciences, la haute culture intellectuelle et la direction des idées.

Faisons donc sur nous-mêmes un examen sévère; étudions nous, sans parti pris de nous encenser stupidement ; examinons notre outillage de combat intellectuel; passons en revue nos forces offensives et défensives, et pesons nos chances de succès ou de défaite dans la lutte de vie ou de mort nationale que nous avons à soutenir, au milieu des races qui nous entourent.

Avançons-nous? Reculons-nous?

La critique honnête et franche; l'exercice du droit de dire respectueusement la vérité aux hommes; de se la dire à soi-même; le courage de faire ses coulpes, est le sel qui préserve de la corruption. Faisons ensemble notre coulpe.

L'homme, l'Etat, les membres du corps social ou religieux qui ne peuvent souffrir qu'on leur dise d'autres vérités que des vérités flatteuses, qui préfèrent le mensonge louangeux à la vérité âpre et fortifiante, sont en pleine décadence. La paresse intellectuelle, et, le plus souvent, l'orgueil, sont assis à leur chevet de moribonds.

Or, pour remplir les obligations de ma charge de président de la section française, à notre Société Royale, j'ai repris la revue rétrospective du mouvement intellectuel chez les nôtres, là où l'a laissée M. Gérin, c'est-à-dire, j'ai remonté jusqu'au commencement de l'année 1900, et j'ai comparé.

Vous donnerai-je franchement les conclusions de mon enquête?

Les progrès que nous faisons sont plutôt lents, et le terrain que nous gagnons ne nous donne aucune avance sur les autres nationalités. Le mouvement intellectuel, commencé parmi nous vers le milieu du siècle dernier, s'est plutôt ralenti. N'avançant pas, nous reculons.

Dans les sciences nous demeurons où nous étions il y a cinquante, il y a vingt-cinq ans, au fin bas de l'échelle. Nous pouvons compter

sur les doigts d'une de nos mains le nombre total de ceux parmi nous qui pourraient occuper en Allemagne, en France, aux Etats-Unis, à McGill, ou dans les provinces-sœurs, une chaire dans l'enseignement de l'histoire naturelle, de la géologie, de la minéralogie, de l'astronomie, de la paléontologie, de la botanique, de la biologie, de l'ethnologie, des mathématiques, de la géographie, de la sociologie, de la chimie, de l'histoire, de la pédagogie.

Et pourtant c'est aux sciences appliquées, c'est à la science, que nous devons tous les progrès dont se glorifie la civilisation moderne. Après la religion, c'est la science qui contient la plus grande somme de vérités qui se puisse acquérir ici-bas. Elle affranchit l'homme, l'élève, l'éclaire, lui fait épeler l'alphabet de la création. La science menait à Dieu, au moyen âge; mais aussi les premiers savants du monde se recrutaient, alors, dans les universités catholiques.

En littérature, où nous sommes si certains d'exceller, nous n'avons rien produit, depuis deux ans et demi, qui se puisse préférer, par exemple, aux *Anciens Canadiens* de M. de Gaspé, à *Jacques et Marie* de Bourassa, ni, peut-être, aux romans historiques de Marmette.

Dans le champ purement littéraire, il est même fort douteux que nous fassions, aujourd'hui, mieux que nos amis les Anglais. Qui opposerons-nous à leurs romanciers Roberts, Fraser, Oxley, Mlle Wood, Mlle Laut et Parker, pour ne nommer que les principaux? La réputation littéraire de quelques-uns de ces auteurs s'étend jusqu'aux Etats-Unis, jusqu'en Angleterre.

Faisons avancer les nôtres, tous ceux qui, depuis le commencement du siècle, ont produit une œuvre littéraire quelconque, et passons la revue de leurs ouvrages. Quelques-uns m'échappent, sans doute, mais c'est le petit nombre.

Pêle-mêle ce sont: *L'oubliée,* par Laure Conan; les *Légendes Canadiennes,* par M. Rouleau; *Deux récits,* par M. Rousseau; *Conteurs Canadiens-Français,* par M. Massicotte; *Mon premier péché,* par Madeleine; *Florence,* par M. Girard; *Soirées du Château de Ramezay,* par l'Ecole littéraire de Montréal; *La vérité révélée,* par M. Magnan; *Claude paysan, Carabinades, Les Ribaud,* par le Dr Choquette; *l'Etoffe du pays,* par M. de Montigny; *Le vieux muet,* par M. Caouette; *Mélanges politiques et littéraires,* par M. Marchand; *Bleu-Blanc-Rouge,* par Colombine; *L'écrin précieux des Jeunes Mères,* par M. St-Cyr; *Précis de l'histoire de la littérature française,* par la Congrégation des sœurs de Sainte-Anne; *Monuments du Mont Royal,* par M. Joseph Brunet; *Jésus-Christ,* par l'abbé Nunésorais; *La grande figure du prêtre,* par le Dr Dionne; *Une fleur canadienne,* par M. Pampalon; *Robert Lozé,* par M. Errol

Bouchette; *Articles et études*, et *Mariages clandestins des catholiques*, par l'abbé Auclair; *Vengeances et fables*, par M. Pamphile Lemay; *La Noël au Canada*, par Louis Fréchette.

Ce sont là de bons ouvrages, pour la plupart; quelques-uns même excellents; mais en vérité ils ne rejettent pas dans l'ombre les productions littéraires des meilleurs écrivains anglais contemporains du Canada.

Nos publicistes, nos nouvellistes, forment une élite brillante. Surtout ceux de Montréal, des jeunes pour la plupart, manient une plume alerte et facile. Ils n'ont pas, cependant, fait oublier Buies, Faucher de Saint-Maurice, Lusignan, Taché, Dessaulles, Chauveau, Aubin, Montpetit.

Beaucoup de talent et quelque originalité; peu d'idées, servies par trop peu de travail et d'études.

Saluons l'entrée dans les lettres canadiennes de l'élément féminin. Nos plus gracieux conteurs, et, à l'occasion, les plus malins, sont aujourd'hui des femmes, ce dont nos cœurs français se sentent doucement émus.

Le journal, qui, il y a vingt-cinq ans, fournissait à grand'peine le gîte, le couvert et l'apéritif à Provencher, à Oscar Dunn, à Cauchon, à Fabre, à de Celles, à David, à Beaugrand, à Gérin, à Laberge, paie aujourd'hui des rentes à Dansereau, à Tarte, à Langlois, à Tardivel, à Pacaud. Est-il pour cela mieux fait? Plusieurs en doutent, malgré l'incontestable talent des rédacteurs de nos grands journaux contemporains.

Paulo majora canamus. Parlons poésie. Les muses canadiennes semblaient, depuis plusieurs années, assoupies parmi les sentes ombreuses de l'Hélicon. Elles s'éveillent; et voici qu'elles accordent leur luth antique, dont elles accompagnent les chansons de Poisson, rêvant sous les grands pins d'Arthabaskaville, et les hymnes lyriques de Chapman, célébrant la France héroïque et les pures gloires du Canada.

D'autres encore parmi nos poètes vont boire aux ondes troublantes de l'Hippocrène, cependant que les sœurs d'Apollon leur sourient.

Leurs chants, toutefois, ne couvrent pas la grande voix de Crémazie, ni les éclats vibrants de l'auteur de la *Légende d'un peuple.*

Dans le domaine de la poésie, je crois, cependant, que nous occupons toujours la première place, au Canada.

En est-il de même de l'histoire ? Nous avions Charlevoix, Ferland, l'abbé Faillon, Sulte, Casgrain, Edouard Richard, de Celles, Roy et Garneau. La plupart sont morts, les autres n'écrivent plus. Allons-nous vivre éternellement de leur gloire, à la façon dont les Espagnols vivent de la gloire du Cid et de Cervantes? Rien n'est plus déprimant que de s'hypnotiser devant un nom, et de se croire tous grands parce que l'un des nôtres le fut.

Les Anglais, M. Doughty, en collaboration avec l'honorable M. Chapais, M. Parmalee et M. Chambers, viennent de nous donner six gros volumes sur le siège de Québec et la bataille des Plaines d'Abraham.

Leurs historiens se nomment Price, Dawson, Wilson, Weir, Hopkins, Hannay, Kingsford et Bourinot — ces deux derniers viennent de mourir.

Qu'avons-nous à opposer à ces ouvrages, d'un mérite inégal, il est vrai, mais dont quelques-uns ont une valeur très réelle?

L'Histoire du Palais épiscopal, par Mgr Tetu; *l'Histoire de Sainte-Foye,* par l'abbé Scott; *l'Histoire des Ursulines des Trois-Rivières, Madame de Ste-Anne,* par le père Charland, *Labrador et Anticosti,* par l'abbé Huard; *Les exploits d'Iberville et la Monongohéla,* par Ed. Rousseau; *l'Histoire de Saint-Luc,* par l'abbé Moreau; *Familles d'Yamachiche,* par F.-L. Desaulniers; *l'Histoire de la paroisse de St-Liguori,* par l'abbé Dugas; *l'Histoire de Charlesbourg,* par M. Trudel; *l'Histoire du Séminaire de Nicolet,* par l'abbé Douville; *Sainte-Marguerite,* par les Sœurs de la Miséricorde; *Frontenac et ses Amis,* par Ernest Myrand; *Bases de l'Histoire d'Yamachiche,* par Raphaël Bellemare; les *Archives Canadiennes,* par Edouard Richard; *Noces de diamant de la Société Saint-Jean Baptiste,* par M. H.-J.-J. Chouinard; *Henri de Bernières,* par l'abbé Gosselin; *Louis Joliette,* par Ernest Gagnon; *Lettres sur l'Ile d'Anticosti,* par Mgr Guay; *Une paroisse historique de la Nouvelle-France,* par M. l'abbé Scott; *Abrégé de l'histoire du Canada,* par les Sœurs de la Charité; *Petite histoire des Etats-Unis,* par Sylva Clapin; *De la fondation du Collège de Rimouski et de son fondateur,* par l'abbé Sylvain; *Monographie de Saint-Ignace du Cap Saint-Ignace,* par l'abbé Sirois.

C'est beaucoup, surtout comme quantité; mais ce n'est pas suffisant. Nous devons faire davantage et mieux encore.

L'histoire est une fontaine de Jouvence, où les peuples vont puiser une éternelle jeunesse. La nôtre, sous bien des rapports, est incomparable. Abreuvons-nous plus souvent à son onde.

Les études sociales et économiques ne reçoivent pas de notre part l'attention qu'elles méritent, et c'est un malheur.

Par contre les questions de jurisprudence, de droit, de coutume, forment le thème de nombreuses études publiées dans nos revues de droit et dans des ouvrages et opuscules spéciaux. La basoche ne perd pas ses droits dans la province de Québec.

Nos médecins n'écrivent guère le résultat de leurs expériences sur leurs semblables. Ils se contentent des expériences de leurs confrères étrangers. Ils guérissent leurs patients, et, au besoin, les enterrent, sans bruit et sans dissertations. Des obituaires font le plus clair de leur littérature. Ils se reposent en paix.

Un mouvement de grande portée, dû à l'initiative de l'Université Laval, a été inauguré depuis quelques années, et produit déjà de très excellents résultats. Je veux parler des cours de littérature française donnés à Montréal et à Québec par des maîtres français, en même temps que des concours littéraires ouverts à la jeunesse canadienne. Faisons venir de France ou d'ailleurs les professeurs de français qui nous manquent, en attendant que nous en produisions nous-mêmes de compétents.

A signaler aussi plusieurs conférences tout à fait remarquables: celle de M. Tardivel, par exemple, sur *La langue française au Canada;* celle de M. Nevers, *Les Anglais et nous,* et celles de M. Henri Bourassa, sur *La Grande Bretagne et le Canada* et sur le *Patriotisme canadien-français.*

Que dirai-je de nos artistes, architectes, peintres, sculpteurs, chanteurs, musiciens?

La jeunesse canadienne, celle du Bas-Canada, est la plus brillante, la plus étincelante, peut-être, qui soit au monde. Tous les talents s'y trouvent en puissance, y abondent, y éclatent spontanément; et cependant peu d'entre nos artistes arrivent à la grande gloire. C'est que nous n'avons pas d'école de beaux-arts, et que nos enfants, pour la plupart, sont trop pauvres pour aller étudier en Europe. Le Carnegie qui voudrait prendre soin de nos artistes en herbe, leur donner la culture qui leur convient, serait plus glorieux que celui qui se charge de nos bibliothèque publiques.

Les dramaturges français fournissent au monde son théâtre. Allons-nous sous ce rapport rivaliser avec nos cousins d'outre-océan Atlantique? On pourrait presque le croire au nombre des pièces qui ont été publiées et jouées durant les deux dernières années et demie. Tragédie en vers, *Subercase,* par le R. P. Brault; drame en vers, *Veronica,* par Louis Fréchette; *Lévis,* drame historique en vers, par l'abbé Marcile; *Pour la Mairie,* comédie en vers, par Arthur Geoffrion.

En prose, le *Drapeau de Carillon,* par David; *Hindelang et de Lorimier,* par Colombine; *Les adieux du poète,* par Madeleine; *Les boules de neige,* par de Montigny.

Nos auteurs dramatiques ne manquent certes pas de talent; mais peut-être l'expérience de la scène et des situations scéniques leur fait-elle quelque peu défaut.

Il me reste à parler de l'éducation—écoles primaires, collèges et couvents, écoles spéciales et écoles techniques.

L'éducation c'est l'arme de combat. Chaque homme s'arme à sa taille, et chaque peuple selon ses nécessités et ses lumières. Les Espagnols ont les canons se chargeant par la gueule; les Chinois, les vieux mousquets du siècle dernier; les nègres d'Afrique, la pique et le

javelot du moyen âge. Leurs armées ne peuvent en aucune façon, avec tout l'héroïsme qui autrefois les rendait victorieuses, supporter le choc des bataillons modernes, armés de pièces perfectionnées.

L'éducation secondaire ne diffère guère chez nous de ce qu'elle était il y a cent ans. Nous chargeons toujours nos canons par la gueule. Les flatteurs

. . . . . Présent le plus funeste
Que puisse faire aux rois la colère céleste,

assurent aux autorités canadiennes,—et les mandarins du Céleste Empire tiennent le même langage à leur reine douairière—qu'il ne faut rien changer, rien ajouter aux anciennes méthodes, parce que ce serait de l'impiété. Or, les mandarins mènent l'Empire du Milieu, autrefois le plus grand de toute la terre, à la désintégration; et nos tristes flatteurs canadiens seront cause que nos corps enseignants, à qui le Canada doit tant, dont le dévouement est digne de tant de respect, dont les cours d'études étaient certainement les plus forts en Amérique, il y a cent-cinquante ans, tomberont dans la déconsidération populaire, si leur néfaste influence prévaut plusieurs années encore.

Ceux qui, parmi nous, aiment les congrégations enseignantes à la manière et avec la virile sincérité dont Fénelon aimait Louis XIV et la royauté, sont comme lui renvoyés en disgrâce, s'ils ont l'audace de dire au roi qu'il n'est pas un dieu et que ses courtisans le trompent et le mènent à sa ruine.

Et personne, au Canada, n'ose toucher à l'arche sainte de l'éducation secondaire et dire franchement la vérité. Il faut se taire ou flatter lourdement.

Pour avoir eu la témérité d'écrire qu'un certain nombre, un trop grand nombre, de professeurs dans nos collèges n'ont pas la compétence requise pour enseigner ce qu'ils enseignent, et avoir proposé une certaine réforme de ce côté-là, j'ai été banni de la société des honnêtes gens; on a décrété que je suis un catholique dangereux; plusieurs estiment que je ne suis plus catholique du tout; un journal de Trois-Rivières a démontré que je suis un sectaire; et certain Recteur d'université, parfaitement estimable d'ailleurs, en séance publique de fin d'année, a prouvé, avec force palmarès et diplômes décernés *honoris causâ*, que nos maisons d'éducation fournissent le plus haut enseignement qui se donne aujourd'hui dans le monde; que les mousquets qui ont fait nos pères vainqueurs à Sainte-Foye, sont plus efficaces que le fusil Lebel; que les Canadiens doivent toujours en armer leurs enfants, et que moi, qui pense différemment, je pourrais bien ne pas être un honnête homme.

Il est aussi malaisé, ici au Canada, de parler de réformes scolaires les plus nécessaires et les plus essentielles, qu'il est dangereux de parler de réformes politiques à la cour de la reine douairière des Fils du Ciel.

Messieurs et chers collègues, je vous laisse, pour ce qu'elles valent, ces conclusions, qui sont honnêtes, si elles ne sont pas tout à fait optimistes.

Pouvons-nous, en notre qualité de membres de la Société Royale, faire quelque chose pour le progrès et l'avancement des nôtres? Pouvons-nous exercer une action utile sur le mouvement intellectuel canadien, dans le domaine des lettres, des arts, des sciences et de l'éducation?

Si nous le pouvons, nous le devons, cela dût-il nous causer quelque effort sérieux; dût-il en résulter quelque inconvénient personnel pour nous.

V.—*Le Père Sébastien Rasles, jésuite, missionnaire chez les Abénaquis, 1657-1724.*

Par N.-E. Dionne, M.D., LL.D.

Bibliothécaire de la Législature de la Province de Québec.

(Lu le 20 mai 1903).

I

En 1894 paraissait à Albany, capitale de l'état de New-York, un gros volume de 450 pages, intitulé: *The Pioneers of New France in New England,* par James Phinney Baxter, A.M., auteur de plusieurs autres ouvrages historiques d'une certaine importance. Ces écrits ont apporté à leur auteur de la notoriété et du prestige dans le monde américain. Son dernier, celui dont nous allons nous occuper, touche à un sujet essentiellement canadien. Malgré le titre général qu'il porte, il n'est en réalité qu'une relation détaillée de la vie du Père Sébastien Rasles, jésuite célèbre qui, de 1689 à 1724, année de sa mort, consacra son talent, son énergie et son zèle d'apôtre à convertir les sauvages, et qui, après avoir fourni la plus laborieuse carrière, comme aussi la plus mouvementée, fut tué par les Anglais, dans sa mission abénaquise de Nanrantsouak, sur les bords de la rivière Kennébec.

Cette mort tragique aurait pu amener des complications sérieuses, si le gouverneur de la Nouvelle-France l'eut voulu. Mais il resta plutôt dans l'indifférence, au grand regret des sauvages, qui avaient perdu leur missionnaire en même temps que l'espoir de continuer à demeurer dans le pays de leurs ancêtres. La mission de Nanrantsouak finit donc avec la disparition du Père Rasles, et bientôt un grand silence se fit dans ces contrées où les Abénaquis avaient vécu pendant de longues années, se croyant maîtres chez eux.

La mémoire du Père Rasles serait vite tombée dans l'oubli, si des historiens, Charlevoix surtout, n'eussent conservé la tradition à son sujet. Cette tradition, respectable à tous égards, fut toujours respectée, du moins dans les grandes lignes. Les historiens américains n'ont guère contredit Charlevoix à venir jusqu'à l'apparition du livre de M. Baxter. Ce dernier a déployé tant de zèle et mis un si grand soin à parfaire son œuvre, que nous nous croyons justifiable de l'apprécier à sa juste valeur, sans arrière pensée comme sans préjugés.

Dans sa préface, M. Baxter commence par affirmer, sans preuves, que le témoignage de Charlevoix ne vaut que ce que valent générale-

ment les récits de voyageurs qui recueillent des notes ici et là, plus ou moins véridiques, les rédigent au hasard de la plume, et puis les lancent dans le public sous forme de livre. Voilà une très grave affirmation, d'autant plus grave qu'elle s'adresse au plus ancien historien de la Nouvelle-France, à un écrivain des plus féconds et des plus érudits, à celui qui a été l'inspirateur de tous les historiens du Canada, des Etats-Unis, et même de France, qui se sont occupés des Canadiens-français. Personnellement nous avions toujours été sous l'impression que le jésuite Charlevoix avait préparé son bel ouvrage sur le Canada avec le plus grand soin, ayant sous les yeux d'abondantes notes et une masse de documents propres à le guider dans l'élaboration de son œuvre. N'étions-nous pas justifiable de penser ainsi, quand tant d'écrivains, anglais et français, protestants et catholiques, l'avaient toujours cité comme un historien digne de foi, ou, sans le citer, lui avaient emprunté, sans lui en donner crédit, une foule de détails qu'ils auraient toujours ignorés sans lui?

Dans ce concert d'éloges nous omettrons systématiquement les écrivains français, dont l'autorité pourrait être suspecte à plusieurs, précisément à cause de leur nationalité. Tenons-nous-en donc aux auteurs anglais ou anglo-américains. Ouvrons John Gilmary Shea à la préface de son excellente traduction de Charlevoix. Que dit-il: "The history of New France, by Father Charlevoix, is too well known and too highly esteemed both for style and matter to need any explanation of its scope or object here. The praise of Gibbon will alone assure the English reader that as an historical work it is of inconsiderable merit."

Nous n'avons pu retracer nulle part l'opinion de Gibbon dont parle ici Shea, mais il n'y a pas de doute que le célèbre historien anglais se prononce favorablement à l'égard de l'ouvrage de Charlevoix.

Nous trouvons dans un ouvrage de date récente, intitulé: "Dictionary of American Literature," deux appréciations de l'*Histoire de la Nouvelle-France,* qui sont loin d'être malveillantes. La première est de Fred. W. Hodge, du bureau ethnologique de Washington. Il s'exprime ainsi: "The author, a French jesuit, well known for his monumental History of New France, was an acute observer... His Letters are replete in valuable information regarding the Indian tribes and settlements visited, etc."

La seconde est de M. Charles W. Colby, professeur d'histoire à l'Université McGill de Montréal: "Charlevoix, dit-il, had command of invaluable sources and shows undoubted cleverness."

Voici une autre opinion provenant d'un historien fort distingué des Etats-Unis, Charles C. Smith, trésorier de la Société historique du Massachusetts, qui a contribué pour une si large part au grand ouvrage

de Justin Winsor: "Narrative and critical history of America." "Among the later French writers the pre-eminence belongs to the Jesuit Father, Pierre François-Xavier de Charlevoix, who had access to contemporaneous materials, of which he made careful use; and his statements have great weight, though he wrote many years after the events he describes."

Qu'est-il besoin de multiplier les opinions sur le mérite et l'autorité du Père Charlevoix, puisqu'il y en a tant qui l'affirment et si peu qui s'inscrivent en faux? M. Baxter a-t-il oublié que l'historien de la Nouvelle-France a résidé à Québec pendant plusieurs années, et qu'il a dû profiter de son séjour ici pour se renseigner le mieux qu'il a pu sur les événements de son temps? Soyons donc de bon compte, et donnons à chacun son dû. L'autorité de Charlevoix est indéniable, et la meilleure preuve que nous puissions en donner, est la persistance avec laquelle tous les historiens du Canada et même des Etats-Unis le citent sans le contredire.

Ce point établi, entrons sans plus tarder dans la vie du Père Rasles, que nous avons écrite avec la plus stricte impartialité, oubliant pour le quart d'heure notre origine française et notre titre de catholique.

II

Sébastien Rasles naquit à Pontarlier, dans la province de Lyon, le 4 janvier 1657. Il entra au collège des Jésuites à Dôle, le 24 septembre 1675. Après y avoir fait son noviciat, il fut nommé professeur de cinquième au séminaire de Carpentras, où il séjourna deux ans, puis il fut appelé à Nîmes, et successivement à Carpentras et à Lyon pour enseigner la théologie. De là il passa à sa troisième année de probation, et il partit pour le Canada le 23 juillet 1689. Pendant les vingt-quatre années qui précédèrent sa vie de missionnaire, le Père Rasles sut trouver assez de loisirs pour s'occuper de bonnes œuvres, et l'on cite entre autres, la congrégation des jeunes ouvriers et celle des portefaix de Lyon qu'il sut diriger avec un zèle admirable. "Personne qui ne vit en lui une âme d'apôtre," écrit le Père de Rochemonteix. "Dévouement, activité, vertu, santé de fer, il avait tout ce qu'il faut pour réussir dans les missions sauvages; aussi ne fut-on pas étonné de le voir s'embarquer pour l'Amérique du Nord. Alors, on s'expliqua également pourquoi ce religieux, si avare de son temps, aimant l'étude et les œuvres de charité, faisait encore de la peinture et des ouvrages de tour: tout cela devait un jour servir au futur apôtre dans les forêts du Nouveau-Monde."[1]

[1] *Les Jésuites et la Nouvelle-France au XVIIe Siècle*, vol. III, p. 470.

Arrivé à Québec le 13 octobre, le Père Rasles fut aussitôt envoyé à la mission abénaquise de Saint-François de Sales [2] pour se mettre au courant de la langue de ces sauvages. " A mon arrivée à Québec, écrit-il à son frère, je m'appliquai à apprendre la langue de nos sauvages. Cette langue est très difficile, car il ne suffit pas d'en étudier les termes et leur signification, et de se faire une provision de mots et de phrases, il faut encore savoir le tour et l'arrangement que les sauvages leur donnent, et que l'on ne peut guère attraper que par le commerce et la fréquentation de ces peuples."

Le Père Rasles, doué comme il l'était d'une merveilleuse mémoire, eut bientôt fait de se familiariser avec l'idiome abénaquis, comme il apprit plus tard à parler avec correction l'illinois, l'outaouais et le huron.

Le 13 août 1691 le Père Rasles quitta Saint-François de Sales pour se rendre chez les Illinois qui venaient de perdre leur missionnaire. Arrêté pendant plusieurs mois à Michillimakinac, il arriva enfin à destination au printemps de 1692. Dans une lettre à son frère il nous fait connaître avec un grand luxe de détails les mœurs et coutumes de ces sauvages lointains au milieu desquels le père Marquette avait, dès 1674, jeté la bonne semence. Le Père Rasles ne demeura avec eux que pendant un an, après avoir opéré tout le bien que son ambition pour la conquête des âmes avait dû lui suggérer.

En 1693, enfin, le Père Rasles fut appelé à prendre le chemin de la mission abénaquise de Nanrantsouak, petit village situé à six milles de Norridgewock, presque vis-à-vis l'embouchure de la rivière Sandy, dans le Kennébec. C'est là qu'il passera les trente dernières années de sa vie, avec ses chers Abénaquis, dont il avait déjà appris par d'autres missionnaires les excellentes dispositions à l'égard de la religion catholique et aussi des Français avec qui ils vivaient dans une douce alliance depuis de longues années déjà. Etant plus rapprochés des centres anglais, les Abénaquis de Nanrantsouak entretenaient des rapports commerciaux plus fréquents et plus suivis avec les négociants de Boston qu'avec ceux de Québec. Mais ils n'allaient pas au delà, restant toujours attachés aux Français et à la religion qui était commune aux deux nations. Les Anglais, eux, voyaient d'un mauvais œil cette amitié; ils auraient préféré s'attacher une peuplade qui, par sa nature belliqueuse, pouvait décider du sort des armes entre les deux peuples rivaux du continent américain. Pour arriver à leur fin, ils eurent recours à divers moyens qu'il est bon de mettre au jour, afin de

[2] Cette mission était à une lieue et demie environ de Québec, dans les parages du saut de la Chaudière. Elle avait été ouverte durant l'été de 1683, et les jésuites l'avaient appelée Saint-Francois-de-Sales, parce qu'ils en avaient conçu l'idée, le 29 janvier, jour où tombe la fête de ce saint.

mieux faire comprendre la conduite du père Rasles au cours des événements qui vont suivre.

Au moment même où le Père prenait possession de sa nouvelle fonction, les Abénaquis concluaient avec les Anglais fortifiés à Pemaquid un traité de paix, qui ne devait pas être de longue durée, car avant l'expiration d'une année, ils avaient fait irruption sur les établissements de la Nouvelle-Angleterre.

Au mois de novembre 1694, Bomaseen, chef des Abénaquis de Nanrantsouak, accourait à Pemaquid, demandant à parler au capitaine March, commandant du fort. Il se déclara fort ennuyé des aggressions de ses congénères, et il assura March que son plus grand désir était d'y mettre un terme. March ne voulut pas l'écouter, comme il aurait dû, et il fit arrêter Bomaseen puis incarcérer à Boston comme traître et suspect. Quelque temps auparavant, les Anglais avaient pris quatre Abénaquis et les avaient mis à l'ombre. Cette conduite fut loin de rencontrer l'approbation générale. Hutchinson, le grand historien du Massachusetts dont l'opinion est assez accréditée, n'hésite pas à déclarer que ces actes de violence ne peuvent être excusés. " C'est une de ces actions, dit-il, qui ont été la cause que les Anglais furent accusés d'injustice à l'égard des sauvages, en les provoquant ainsi à toutes les cruautés qu'ils ont commises pour se venger d'eux."

L'exaspération des Abénaquis, à la vue de tant d'actes hostiles de la part d'une nation qu'ils détestaient d'avance, parvint bientôt à son comble. Témoin de ces faits, le Père Rasles aurait bien voulu faire consentir les sauvages à rester tranquilles, mais comment leur faire saisir que l'esprit de vengeance est indigne d'un bon chrétien, quand eux n'y voyaient qu'un acte de courage et même de vertu ? Tout de même il réussit à leur faire comprendre qu'il valait mieux attendre des circonstances plus favorables pour obtenir des Anglais ce qu'ils demandaient, c'est-à-dire la reconnaissance de leur droit à rester maîtres chez eux.

Le traité de Riswyck, signé en 1698, vint jeter un peu d'eau froide sur les ardeurs guerrières des Abénaquis, bien qu'il ne réglât pas la sempiternelle question des limites de l'Acadie. Aux yeux des Anglais, le territoire habité par les sauvages de Nanrantsouak restait toujours attaché à leur domaine, tandis que les Français le réclamaient pour eux. Le fait est qu'il n'appartenait ni à l'une ni à l'autre des deux nations. Les Abénaquis prétendaient rester les maîtres du sol à titre de *primi occupantis*, de même que les Iroquois que personne n'avait encore troublés sous ce rapport parce qu'on les savait trop redoutables. Pourquoi l'Angleterre agissait-elle autrement à l'égard des Abénaquis ? Est-ce parce qu'ils étaient plus faibles, moins populeux ? Quoique valeureux, les Abénaquis ne demandaient pas mieux que de vivre en paix

avec leurs voisins, Français et Anglais, mais à condition que leurs terres ne fussent pas envahies par les étrangers.

Neuf années s'étaient déjà écoulées depuis le jour où le Père Rasles avait mis le pied sur le rivage du Kennébec; son œuvre de missionnaire portait des fruits de salut, mais elle était sans cesse exposée à subir de terribles assauts. Le voisinage des Anglais était un danger constant pour la foi des Abénaquis; s'ils prêtaient allégéance à l'Angleterre, c'eût été périlleux. Aussi préférait-il les voir rester en bons termes avec les Français, leurs amis de vieille date. En 1703, le gouverneur Dudley fit demander aux Abénaquis une entrevue à Casco, afin de leur soumettre ses projets à leur égard. Il leur fixait la date du 20 juin. Ceux-ci consentirent, mais à la condition que le Père Rasles assisterait aux délibérations, afin, disaient-ils, que tout se passât sans préjudice à leur religion et au roi de France. Le missionnaire ne se souciait pas de prendre part à cette conférence, ne fût-ce qu'à titre de témoin muet, car il savait d'avance qu'il n'en résulterait rien de bon pour ses ouailles. Cependant, de guerre lasse, il finit par consentir à les accompagner, suivant sa coutume.

"Je me trouvai, dit-il, où je ne souhaitais pas être, et où le gouverneur ne souhaitait pas que je fusse." De son côté le gouverneur avait eu la précaution de se faire accompagner d'un ministre de son culte. Son adresse aux Abénaquis est acquise à l'histoire. "C'est par ordre de notre reine, dit-il aux sauvages réunis, que je viens vous voir; elle souhaite que nous vivions en paix. Si quelque Anglais était assez imprudent pour vous faire du tort, ne songez pas à vous en venger, mais adressez-moi aussitôt votre plainte, et je vous rendrai une prompte justice. S'il arrivait que nous eussions la guerre avec les Français, demeurez neutres, et ne vous mêlez point de nos différends: les Français sont aussi forts que nous; ainsi, laissez-nous vider ensemble nos querelles. Nous fournirons à tous vos besoins, nous prendrons vos pelleteries, et nous vous donnerons nos marchandises à un prix modique.[3]

Puis, prenant à part le Père Rasles, le gouverneur anglais lui dit: "Je vous prie, monsieur, de ne pas porter vos Indiens à nous faire la guerre." Ce à quoi le missionnaire répondit avec la plus ferme assurance: "Ma religion et mon caractère de prêtre m'engagent à ne leur donner que des conseils de paix."[4]

C'était au tour des sauvages à prendre la parole. L'un d'eux s'avançant auprès du gouverneur, lui dit dans son langage à lui: "Grand Capitaine, tu nous dis de ne point nous joindre au Français,

[3] *Lettres édifiantes et curieuses, écrites des missions étrangères*, Paris, 1781, t. VI, pp. 202-203.

[4] *Ibidem*, p. 203.

supposé que tu lui déclares la guerre; sache que le Français est mon frère; nous avons une même prière lui et moi, et nous sommes dans une même cabane à deux feux, il a un feu et moi l'autre. Si je te vois entrer dans la cabane du côté du feu où est assis mon frère le Français, je t'observe de dessus ma natte, où je suis assis à l'autre feu. Si, en t'observant, je m'aperçois que tu portes une hache, j'aurai la pensée: que prétend faire l'Anglais de cette hache ? Je me lève pour lors sur ma natte, pour considérer ce qu'il fera. S'il lève la hache pour frapper mon frère le Français, je prends la mienne et je cours à l'Anglais pour le frapper. Est-ce que je pourrais voir frapper mon frère dans ma cabane, et demeurer tranquille sur ma natte ? Non, non, j'aime trop mon frère, pour ne pas le défendre. Ainsi je te dis, grand capitaine. ne fais rien à mon frère et je ne te ferai rien; demeure tranquille sur ta natte, et je demeurerai en repos sur la mienne." [5]

Ainsi finit cette conférence. L'Anglais s'en retourna chez lui sans avoir pu faire consentir les Abénaquis à rester indifférents dans les luttes qui pouvaient éclater d'un jour à l'autre entre les colonies française et anglaise d'Amérique. Le fait est que peu de temps après l'on apprit à Nanrantsouak par des sauvages de retour de Québec, que la guerre était allumée entre la France et l'Angleterre. Aussitôt les sauvages ouvrirent leur conseil, et après avoir mûrement délibéré sur ce qu'ils devaient faire, ils ordonnèrent aux jeunes gens de tuer les chiens pour le festin de guerre; l'on ferait ce jour-là le recrutement des guerriers. Le festin eut lieu, et 250 Abénaquis s'engagèrent à prendre les armes contre les Anglais. Puis tous coururent se confesser au père Rasles. "Je les exhortai, dit-il, à être aussi attachés à leur prière que s'ils étaient au village, à bien observer les lois de la guerre, à n'exercer aucune cruauté, à ne tuer personne que dans la chaleur du combat, à traiter humainement ceux qui se rendraient prisonniers, etc."

Les 250 guerriers Abénaquis se dispersèrent ensuite sur le territoire anglais par groupes variables, et au jour fixé pour frapper un grand coup, ils firent main basse sur les villages désignés d'avance, tuèrent deux cents personnes et ramenèrent cent cinquante prisonniers.

Pendant tout le temps que dura cette guerre néfaste, les Abénaquis ne cessèrent pas de porter la désolation sur le territoire anglais, ravageant les villages, détruisant les métairies et les forts, enlevant les bestiaux et grossissant le chiffre de leurs prisonniers.

Ces drames sanglants devaient susciter de terribles représailles de la part des Anglais. Durant l'hiver de 1705, le colonel Hilton, à la tête de 275 soldats munis de provisions pour trois semaines, furent

[5] *Ibid.*, p. 204, Penhallow rapporte autrement cette entrevue.

envoyés à Nanrantsouak pour s'emparer du père Rasles et saccager le village. Les Abénaquis ayant eu vent de cette expédition, et se sentant incapables de résister à un ennemi aussi puissant, se sauvèrent dans les bois, abandonnant leur village à l'ennemi. Celui-ci brûla l'église, les cabanes et s'en retourna sans plus de succès. Le Père Rasles, de son côté, rapporte que les Abénaquis étaient absents de leur village, mais nullement par suite de la peur des Anglais.

Le traité d'Utrecht signé en 1713 vint mettre fin à ces hostilités qui, somme toute, n'eurent d'autre résultat que de remettre en question les droits que possédait l'Angleterre sur l'Acadie et sur le territoire occupé par les Abénaquis. Au lieu de nommer des commissaires qui eussent fixé la ligne de démarcation entre les deux colonies, en conservant les anciennes limites, comme l'avait proposé le Père Aubery dans ses *Mémoires* à la cour, l'on eut recours de part et d'autre au *statu quo*. C'était ouvrir la porte à de nouvelles contestations, qui ne pouvaient être réglées amicalement, chacune des colonies s'en tenant à ses vieilles prétentions. Les Abénaquis devaient souffrir de cet état de choses.

Aux premières nouvelles de la paix, le gouverneur de la Nouvelle-Angleterre fit savoir aux sauvages qu'il désirait les rencontrer à Portsmouth, afin de conférer avec eux sur la présente conjoncture des affaires. L'entrevue eut lieu à l'endroit fixé d'avance, à la date du 11 juillet 1713. Il leur parla comme suit: "Toi homme Naranhous, je t'apprends que la paix est faite entre le Roi de France et notre Reine, le Roi de France cède à notre Reine l'Iaisance et Port-Royal avec toutes les terres adjacentes. Ainsi, si tu veux, nous vivrons en paix toi et moi: nous y étions autrefois, mais les suggestions des Français te l'ont fait rompre, et c'est pour lui plaire que tu es venu nous tuer. Oublions toutes ces méchantes affaires, et jetons-les dans la mer, afin qu'elles ne paraissent plus, et que nous soyons bons amis."

"Cela est bien, répondit l'un des sauvages, que les Rois soient en paix, j'en suis bien aise, et je n'ai pas de peine non plus à la faire avec toi. Ce n'est point moi qui te frappe depuis douze ans, c'est le Français qui s'est servi de mon bras pour te frapper. Nous étions en paix, il est vrai, j'avais même jeté ma hache je ne sais où, et comme j'étais en repos sur ma natte, ne pensant à rien, des jeunes gens m'apportèrent une parole que le gouverneur du Canada m'envoyait, par laquelle il me disait: mon fils, l'Anglais m'a frappé, aide-moi à m'en venger, prends ta hache, et frappe l'Anglais. Moi qui ai toujours écouté la parole du gouverneur Français, je cherche ma hache, je la trouve enfin toute rouillée, je l'accommode, je la pends à ma ceinture pour te venir frapper. Maintenant le Français me dit de la mettre bas; je la

jette bien loin, pour qu'on ne voie plus le sang dont elle est rougie. Ainsi, vivons en paix, j'y consens.

"Mais tu dis que le Français t'a donné Plaisance et Port Royal, qui est dans mon voisinage, avec toutes les terres adjacentes; il te donnera tout ce qu'il voudra, pour moi j'ai ma terre que le Grand Génie m'a donnée pour vivre: tant qu'il y aura un enfant de ma nation, il combattra pour la conserver."

Cette deuxième conférence n'eut pas de résultats plus heureux que la première pour les Anglais de la Nouvelle-Angleterre. Les Abénaquis consentaient bien à garder la plus stricte neutralité, tant qu'il n'y aurait pas de guerre entre leurs deux voisins d'origine européenne. Ils surent profiter de la suspension d'armes pour rebâtir leur église que les Anglais avaient détruite. Ils s'adressèrent à Boston pour obtenir les ouvriers nécessaires. Informé de leurs démarches, le gouverneur leur fit dire qu'il bâtirait leur église à ses frais, s'ils consentaient à recevoir chez eux un ministre protestant et à renvoyer le Père Rasles à Québec. Les sauvages refusèrent cette offre, en disant que le gouverneur français relèverait leur chapelle de ses ruines, s'ils lui demandaient cette faveur. C'est en effet ce qui eut lieu, et ils virent bientôt se dresser un temple d'assez bonne dimension que le Père Rasles, avec son talent universel, sut orner avec goût et même avec un certain luxe.[6] "J'ai bâti, dit-il dans une lettre à son neveu, du 15 octobre 1722, une église qui est propre et très ornée. J'ai cru ne devoir rien épargner ni pour la décoration ni pour la beauté des ornements, qui servent à nos saintes cérémonies: parements, chasubles, chapes, vases sacrés, tout y est propre, et serait estimé dans nos églises d'Europe. Je me suis fait un petit clergé d'environ quarante jeunes sauvages qui assistent au service divin en soutane et en surplis. Il ont chacun leurs fonctions. . . . Le grand luminaire ne contribue pas peu à la décoration de l'église; je n'ai pas lieu de ménager la cire, car ce pays m'en fournit abondamment."

La nation abénaquise était profondément chrétienne. Le Père Rasles lui rend ce témoignage dans les lettres qui sont restées de lui. "Tous mes néophytes, dit-il, ne manquent pas de se rendre deux fois par jour à l'office, dès le grand matin pour y entendre la messe, et le soir pour assister à la prière que je fais au coucher du soleil. Comme il est nécessaire de fixer l'imagination des sauvages, trop aisés à se distraire, j'ai composé des prières propres à les faire entrer dans l'esprit de l'auguste sacrifice de nos autels; ils les chantent ou bien ils les récitent à haute voix pendant la messe. Outre les prédications que je leur fais, les dimanches et fêtes, je ne passe guère de jours ouvriers sans leur faire une courte exhortation. Après la messe, je fais le catéchisme

[6] Francis raconte autrement l'histoire de cette construction, p. 242-243.

aux enfants et aux jeunes gens: grand nombre de personnes âgées y assistent.. .. Le reste de la matinée jusqu'à midi est destiné à entendre tous ceux qui ont à me parler. C'est alors qu'ils viennent en foule me faire part de leurs peines et de leurs inquiétudes, ou me consulter sur leurs affaires particulières.. .. L'après-midi, je visite les malades et je parcours les cabanes de ceux qui ont besoin de quelque instruction particulière. S'ils tiennent un conseil, ce qui arrive souvent parmi les sauvages, ils me députent un des principaux de l'assemblée, pour me prier d'assister au résultat de leurs délibérations. Je me rends aussitôt au lieu où se tient le conseil; si je juge qu'ils prennent un sage parti, je l'approuve; si, au contraire, je trouve à dire à leur décision, je leur déclare mon sentiment que j'appuie de quelques raisons solides, et ils s'y conforment. Mon avis fixe toujours leurs résolutions. Il n'y a pas jusqu'à leurs festins où je suis appelé."

Le fait est que les missionnaires chez les peuplades abénaquises, jouirent toujours d'un grand prestige. Aussi méritaient-ils tous, sans en excepter un seul, qu'on les écoutât, qu'on leur obéît même dans les circonstances difficiles de leur existence comme peuple. Leurs avis ou leurs conseils étaient généralement marqués au coin de la plus profonde sagesse, parce qu'ils étaient désintéressés. Voilà qui explique pourquoi les Anglais de la Nouvelle-Angleterre accusèrent toujours les missionnaires d'être la cause des malheurs qui leur tombaient sur le dos chaque fois que l'Abénaquis déterrait sa hache de guerre. Ils en voulurent tout particulièrement au Père Rasles, rendu plus suspect que tout autre à raison de sa longue carrière comme missionnaire, et à raison surtout des circonstances qui voulurent que cette période de 1694 à 1723 fut plus particulièrement mouvementée. Glissons, en outre, sur la question religieuse, sur la grande lutte du protestantisme contre le catholicisme, qui dans ces temps reculés, primait peut-être la question politique. Un jésuite était considéré par les sectes protestantes comme un homme hors la loi, un être à part, qu'on pouvait injurier, bafouer impunément.[7] Le Père Rasles ne devait pas faire exception à la règle établie, et l'on verra plus tard comment on s'y prit pour lui enlever son autorité et le bâillonner à tout jamais.

Persuadé maintenant que sa démarche auprès des Abénaquis avait abouti à un fiasco, le gouverneur Dudley résolut de changer de tactique. Il connaissait l'attachement de ces sauvages à leur progéniture, il leur envoya un ministre de son culte avec instruction d'ouvrir une école à Old-Town, sur les rives du Kennébec, et de pensionner les enfants aux frais de son gouvernement. C'était les prendre par leur

[7] Un acte de la cour générale du Massachusetts, du 15 juin 1700, chassait les jésuites de la province, à l'égal d'un incendiaire, etc.

côté sensible, le cœur et la bourse. Le ministre-instituteur s'installa donc au milieu des sauvages, attendant la venue des élèves. Le recrutement marcha mal. Deux mois s'étaient écoulés et pas un seul enfant n'avait fait acte de présence. Pourtant le révérend M. Baxter—[8] c'était son nom — n'avait rien négligé pour réussir, d'autant moins que son salaire devait augmenter dans la proportion du nombre de ses élèves: présents, caresses, bons procédés de toute nature, rien n'y fit; les sauvages se montraient irréconciliables. Ne sachant que faire, il crut gagner son point en essayant d'endoctriner son entourage; il jeta le ridicule sur les dogmes de la religion et sur les pratiques des catholiques, comme la récitation du chapelet, le culte des images, etc. "Je crus, écrit le Père Rasles, devoir m'opposer à ces premières semences de séduction. J'écrivis une lettre honnête au ministre, où je lui marquais que mes chrétiens savaient croire les vérités que la Foi catholique enseigne, mais qu'ils ne savaient pas en disputer; que n'étant pas assez habiles pour résoudre les difficultés qu'il proposait, il avait apparemment dessein qu'elles me fussent communiquées, que je saisissais avec plaisir cette occasion qu'il m'offrait d'en conférer avec lui, ou de vive voix, ou par lettres."

Le Père Rasles composa donc un long Mémoire de près de cent pages, où il se faisait l'apologiste de la religion catholique, de ses dogmes et de son culte, et il le fit parvenir au révérend M. Baxter. Celui-ci quitta aussitôt Old-Town pour Boston, où il prépara avec soin sa réponse. Le document est en latin,[9] mais d'un latin vulgaire que le Père Rasles put sans doute comprendre suffisamment pour pouvoir refuter les erreurs théologiques qu'il renfermait; il en fit part à son contradicteur. Se sentant incapable de continuer la discussion, M. Baxter se contenta d'écrire au Père Rasles, l'accusant d'être un homme colère, un esprit chagrin, etc. — beaucoup de personnalités, mais peu d'arguments à l'appui de sa thèse anticatholique.

Malgré sa récente déconfiture, le gouverneur Dudley ne se tint pas pour battu. Cette fois le danger pour les Abénaquis allait prendre des proportions beaucoup plus grandes, parce qu'ils tombèrent dans le panneau de leur propre gré. Un marchand bostonnais leur ayant demandé la permission d'établir un comptoir sur les bords du Kennébec, ils y consentirent sans réfléchir aux conséquences. Bientôt il en arriva

[8] Le révérend Joseph Baxter était né à Braintree, Mass., en 1676. De 1695 à 1717, il fut recteur de l'église de Medfield, qu'il abandonna pour se rendre à Arrowsic, maintenant Georgetown, Maine. Il mourut en 1745.

[9] Un latiniste distingué à qui nous avons communiqué les lettres du révérend M. Baxter, nous écrit: "Somme toute, la latinité du ministre protestant laisse singulièrement à désirer, et sa lettre méritait pour la plupart des phrases qu'on y lit cette censure du Père Rasles: *Tu anglice loqueris utendo verbis latinis.* On y remarque plusieurs tournures anglaises, des fautes grossières contre la grammaire, des termes impropres, etc."

un second, et puis un troisième. Finalement, ils devinrent si nombreux que les Abénaquis commencèrent à s'alarmer, surtout lorsqu'ils s'aperçurent qu'ils érigeaient des petits forts pour se mettre en sûreté. Ils comprirent, qu'à la première occasion, il y aurait rupture de bons procédés et qu'une guerre pourrait surgir entre eux. Ils députèrent quelques-uns des leurs auprès du marquis de Vaudreuil, gouverneur de la Nouvelle-France, afin d'obtenir du secours des Français. Celui-ci, qui ne voulait pas prendre d'engagement en temps de paix, répondit évasivement qu'il leur fournirait des armes et des munitions. Mais les Abénaquis insistèrent, et déclarèrent qu'ils chasseraient tous les étrangers, Français comme Anglais, si on les abandonnait à leurs seules ressources. Le gouverneur protesta alors "qu'il marcherait même à leur tête, plutôt que de les abandonner à la merci des Anglais." Les délégués se retirèrent à demi-satisfaits, n'ajoutant pas trop foi à la sincérité de M. de Vaudreuil; la suite des événements devait leur donner raison.

Peu de temps après, quelques Abénaquis étaient à trafiquer paisiblement leurs pelleteries chez un négociant anglais, lorsqu'ils s'aperçurent que la maison était entourée d'une couple de cents hommes armés. "Nous sommes morts, s'écrie l'un d'eux, vendons cher notre vie." Et les voilà qui arment leurs fusils, prêts à faire feu contre ces ennemis redoutables. "Ne vous alarmez pas, répartit l'Anglais, nous ne vous voulons pas de mal. Nous venons seulement vous prier d'envoyer à Boston quelques-uns de vos chefs pour y conférer avec le gouverneur sur les moyens d'entretenir la paix entre les deux nations." Toujours crédules, les sauvages députèrent quatre des leurs à Boston, et là on les fait prisonniers, au mépris du droit des gens, car on était alors en pleine paix. Les représentations des Abénaquis n'eurent d'autre résultat que d'aggraver la situation; après leur avoir arraché pour deux cents francs de peaux de castor, comme rachat des prisonniers, le gouverneur n'en continua pas moins à les garder soi-disant comme ôtages.

Les sauvages, de plus en plus irrités, auraient fondu comme des lions sur les colons anglais, si le missionnaire ne s'y était opposé de toutes ses forces. Ils durent se contenter d'adresser au gouverneur de Boston une lettre-ultimatum, dont voici la substance: 1o Les Abénaquins ne peuvent comprendre pourquoi on retenait leurs députés dans les fers, après la parole qu'on avait donnée de les rendre aussitôt que les deux cents livres de castor seraient payées; 2o ils ne sont pas moins surpris de voir qu'on s'empare de leur pays sans leur agrément; 3o les Anglais devront en sortir au plus tôt ou élargir les prisonniers; ils attendront leur réponse dans deux mois, et si, après ce temps-là, on refuse de les satisfaire, ils sauront bien se faire justice."

Dudley répondit à cette sommation en s'emparant du jeune baron de Saint-Castin, dont la mère était Abénaquise, et en l'incarcérant à Boston, puis en mettant à prix la tête du père Rasles. "On était persuadé à Boston, dit Charlevoix, que ce missionnaire serait toujours un obstacle invincible au dessein qu'on y avait formé de s'emparer peu à peu de tout le pays qui sépare la Nouvelle-Angleterre de l'Acadie, parce qu'en maintenant avec soin les néophytes dans la foi catholique, il resserrait de plus en plus les liens qui les unissaient aux Français. Après plusieurs tentatives, d'abord pour engager ces sauvages par les offres et les promesses les plus séduisantes à le livrer aux Anglais, ou du moins à le renvoyer à Québec, et à prendre en sa place un de leurs ministres; ensuite, pour le surprendre et l'enlever; les Anglais, résolus de s'en défaire, quoi qu'il dût leur en coûter, mirent sa tête à prix, et promirent mille livres sterling à celui qui la leur porterait. Tout cela ayant été inutile, ils crurent enfin avoir trouvé une occasion de se saisir de sa personne, vers la fin de janvier 1722."[10]

Plus l'Anglais mettait d'acharnement à traquer le père Rasles, plus les Abénaquis lui montraient de dévouement. Un jour le bruit courut que les ennemis avaient envahi le quartier où logeait le missionnaire. Aussitôt les Abénaquis décident de les chasser et de les poursuivre jusque dans leurs derniers retranchements, dût-il leur en coûter la vie. Mais, comme c'était une fausse alerte, les sauvages durent se calmer.

De pareilles scènes se renouvelèrent souvent, et toujours les sauvages se montrèrent disposés à la défendre. Voyant qu'un jour ou l'autre il lui arriverait malheur, ils lui proposèrent de s'enfoncer plus avant dans les terres vers Québec. Il leur répondit: "Quelle idée avez-vous de moi ? Me prenez-vous pour un lâche déserteur ? Hé ! que deviendrait votre foi, si je vous abandonnais ? Votre salut m'est plus cher que la vie." Au père de La Chasse qui, étant venu le voir, lui conseillait de prendre des mesures pour mettre sa vie en sûreté, il disait:

"Mes mesures sont prises, Dieu m'a confié ce troupeau, je suivrai son sort, trop heureux de m'immoler pour lui."

De son côté, le missionnaire, prévoyant le jour où les Abénaquis seraient chassés de leur pays par les Anglais, leur exprimait ses craintes et les engageait à aller planter ailleurs leurs tentes. "Nous y consentirons, répondaient les sauvages, à la condition que tu nous accompagneras." "Impossible, je ne partirai pas, répliquait le Père, mon devoir est de rester ici, pour donner les secours de mon ministère aux infirmes et aux vieillards. Je ne tiens pas à la vie; au contraire, je mourrai avec joie dans ce village, en remplissant les devoirs que Dieu m'a imposés. C'est d'ailleurs ce que je désire depuis longtemps. Quant à

[10] Charlevoix, II, pp. 380-381.

vous, rien ne vous retient ici. Fuyez, pour éviter une mort certaine." Plusieurs écoutèrent la voix du missionnaire, et émigrèrent vers Québec en 1722.

Vers ce temps-là, les Anglais résolurent encore une fois de s'emparer du père Rasles. Westbrooke, a la tête de deux cents hommes bien déterminés, arrive à l'improviste au village de Nanrantsouak. Heureusement les Abénaquis ont appris l'apparition de la troupe ennemie, et ils se sauvent dans les bois, car il leur est impossible de se défendre, la plupart d'entre eux sont à la chasse, et il ne reste au village que les femmes, les vieillards et les infirmes. Le père Rasles se sauve avec eux, après avoir consommé les saintes espèces. Westbrooke arrive sur l'entrefaite et se met à la poursuite des sauvages, qu'il ne peut atteindre. Le père Rasles échappe comme par miracle à la vue des soldats qui, rendus à dix pieds de sa cachette, rebroussent tout-à-coup chemin. Retournés au village, les soldats pillent l'église, la résidence du missionnaire, enlèvent ses papiers, son dictionnaire abénaquis, [11] et toutes les provisions qui leur tombent sous la main, puis ils s'en retournent dans leur pays. Mais comme il leur fallait à tout prix la tête du père Rasles, ils organisèrent une nouvelle expédition qui, cette fois, devait réussir.

Westbrooke part de Boston le 4 mars 1723, s'empare de Pentagoët qu'il détruit de fond en comble, puis il se dirige sur Nanrantsouak, et essaie à deux reprises de s'emparer du père Rasles. Alors on redouble ses forces. Une véritable armée s'organise à Boston et vient fondre à l'improviste sur le village des Abénaquis, dans la nuit du 24 août 1724. Trop faibles pour se défendre, car ils ne sont qu'une cinquantaine de guerriers valides, ils se sauvent à travers les bois, emmenant les femmes, les vieillards et les enfants. Le bruit de la fusillade attire le Père Rasles en dehors de sa chapelle. En l'apercevant les Anglais jettent un grand cri de joie et font pleuvoir sur lui une grêle de balles. Il tombe au pied d'une croix qu'il avait fait planter au milieu du village.

N'apercevant aucune résistance, les Anglais pillent les cabanes, profanent les vases sacrés, puis incendient l'église. Après avoir massacré quelques femmes et des enfants qui n'avaient pas eu le temps de fuir, ils quittent précipitamment le village, comme pris d'une terreur subite.

Cent cinquante sauvages avaient échappé au massacre. Revenus dans leur village que l'incendie avait ruiné, ils aperçurent bientôt le

[11] Le manuscrit de ce dictionnaire, conservé à l'Université de Harvard, est un petit in-quarto, et fut imprimé dans les Mémoires de l'Académie Américaine des arts et des sciences, en 1833 (Vol. I, pp. 375 à 574.) Sur le premier feuillet le Père Rasles avait écrit: "1691. Il y a un an que je suis parmi les sauvages, je commence à mettre en ordre en forme de dictionnaire les mots que j'apprends." Il l'avait donc commencé lors de son séjour à la mission de St-François de Sales.

cadavre du père Rasles, la chevelure enlevée, le crâne fracassé, et tout le corps mutilé. Ils s'emparèrent de la précieuse dépouille, et l'ensevelirent à l'endroit même où, la veille, il avait célébré les saints mystères.

Le Père Rasles était dans la soixante-septième année de son âge; il en avait consacré trente-quatre aux missions sauvages. Avec lui s'éteignit la mission de Nanrantsouak. Les Abénaquis se dispersèrent un peu partout, mais le gros de la nation vint échouer dans les missions du Canada, où ils s'unirent à leurs frères pour continuer à vivre chrétiennement à l'ombre du drapeau de l'Eglise catholique. Leur foi ne s'est jamais démentie depuis cette époque, grâce au zèle des missionnaires qui ne ménagèrent rien pour leur ouvrir le Ciel.

III

Il ne nous reste plus maintenant qu'à rapporter les divers témoignages des écrivains qui ont mentionné dans leurs ouvrages le célèbre missionnaire jésuite. L'éloge est la note générale, bien que chez quelques-uns la louange perde singulièrement de sa valeur à côté des critiques plus ou moins acerbes de sa conduite. Ainsi Francis Convers, son principal biographe, après avoir ajouté à son nom les qualificatifs d'ambitieux, de partisan, d'autocrate, d'arrogant, de caustique, finit par la déclaration suivante: "Je ne puis analyser son histoire sans recevoir l'impression qu'il fut pieux, dévoué, un homme extraordinaire. Nous avons devant nous un savant nourri au banquet de la science européenne, accoutumé aux raffinements de l'une des nations les plus cultivées du vieux monde, qui dit adieu aux joies du foyer et aux attractions de sa terre natale, pour passer trente-cinq ans de sa vie au sein des forêts, sur un rivage lointain, au milieu de sauvages dégoûtants, seul, sans compagnon, si ce n'est les féroces enfants des bois. Avec eux il vécut comme un frère, comme un bienfaiteur, comme un ami; partageant leur sort, leurs coutumes, leurs besoins, leurs périls, les rigueurs du climat; tenant sa vie pour peu de chose dans l'accomplissement du devoir, et la terminant victime des dangers auxquels il a dédaigné se soustraire. Il a fait tout cela dans le but d'amener au bercail de son église ces hommes primitifs, où ils devaient, d'après lui, apprendre à connaître le vérité et la lumière de la foi qui vient du Ciel."

Si, réellement, le Père Rasles était un homme aussi extraordinaire que l'a écrit Convers, comment pouvait-il être arrogant, autocrate, ambitieux, etc. ? Voilà un exemple de cet illogisme qui caractérise les écrits de certains auteurs protestants lorsqu'ils parlent des catholiques ou du catholicisme, sans les connaître.

Francis prétend que le Père Rasles se laissait guider dans ses actes par cet article de la théologie catholique, qui veut que la fin justifie les moyens. M. Baxter lui-même semble vouloir insinuer la même chose, par le fait que l'on trouva dans les papiers du Père Rasles l'ouvrage du Père Busembaum, intitulé: *Medulla Theologicae Moralis,* qui aurait émis une semblable opinion. Or, rien de plus faux: ni l'Eglise catholique, ni Busembaum, ni le père Rasles n'ont professé une semblable doctrine. Du reste, le seul fait que l'ouvrage de Busembaum ait été trouvé dans la bibliothèque du Père Rasles, n'est pas une preuve que celui-ci partageait toutes les opinions théologiques de son confrère.

Passons à d'autres témoignages. Le père de la Chasse, qui avait connu intimement le Père Rasles, en parle avec éloge: " Il était infatigable, écrivait-il, le 29 octobre 1724, à un religieux de son ordre, dans les exercices de son zèle; sans cesse occupé à exhorter les sauvages à la vertu, il ne pensait qu'à en faire de fervents chrétiens. Sa manière de prêcher, véhémente et pathétique, faisait de vives impressions sur les cœurs.. .. Il ne se contentait pas d'instruire presque tous les jours les sauvages dans son église, il les visitait souvent dans leurs cabanes; ses entretiens familiers les charmaient; il savait les assaisonner d'une gaieté sainte qui plaît beaucoup plus aux sauvages qu'un air grave et sombre; aussi avait-il l'art de leur persuader tout ce qu'il voulait; il était parmi eux comme un maître au milieu de ses élèves.

" Nonobstant les continuelles occupations de son ministère, il n'omit jamais les saintes pratiques qui s'observent dans nos maisons. Il se levait et faisait son oraison à l'heure qui y est marquée. Il ne se dispensa jamais des huit jours de la retraite annuelle; il s'était prescrit pour la faire les premiers jours du carême, qui est le temps que le Sauveur entra dans le désert.. ..

" La pauvreté religieuse éclatait dans toute sa personne, dans ses meubles, dans son vivre, dans ses habits. Il s'interdit, par esprit de mortification, l'usage du vin, même lorsqu'il se trouvait au milieu des Français; de la bouillie, faite de farine de blé-d'inde, fut sa nourriture ordinaire. Durant certains hivers, où quelquefois les sauvages manquent de tout, il se vit réduit à vivre de glands; loin de se plaindre alors, il ne parut jamais plus content.. .. C'était lui qui cultivait son jardin, qui préparait son bois de chauffage, sa cabane et sa sagamité, qui rapiéçait ses habits déchirés, cherchant par esprit de pauvreté à les faire durer le plus longtemps qu'il lui était possible. La soutane qu'il portait lorsqu'il fut tué, parut si usée et en si mauvais état à ceux qui l'en dépouillèrent, qu'ils ne daignèrent pas se l'approprier, comme ils en eurent d'abord le dessein. Ils la rejetèrent sur son corps, et nous la renvoyèrent à Québec.

" Autant il se traitait durement lui-même, autant il était compatissant et charitable pour les autres. Il n'avait rien à lui, et tout ce qu'il recevait, il le distribuait aussitôt à ses pauvres néophytes. Aussi la plupart ont-ils donné à sa mort des démonstrations de douleur plus vive que s'ils eussent perdu leurs parents les plus proches... .. .. .. Vous jugez bien, mon révérend père, que ses vertus dont la Nouvelle-France a été témoin depuis tant d'années lui avaient concilié le respect et l'affection des Français et des sauvages. Personne ne doute qu'il ait été immolé en haine de son ministère et de son zèle à établir la vraie foi dans le cœur des sauvages. C'est l'idée qu'en a M. de Bellemont, supérieur du séminaire de Saint-Sulpice, à Montréal. Lui ayant demandé les suffrages accoutumés pour le défunt, à cause de la communication de prières qui est entre nous, il me répondit, en se servant des paroles si connues de saint Augustin, que c'était faire injure à un martyr, que de prier pour lui. *Injurium facit martyri qui orat pro eo.*"

Cette lettre du Père de la Chasse, alors supérieur de la mission des jésuites, dans la Nouvelle-France, est un document important, pour ce qui regarde en particulier le caractère du Père Rasles, son genre de vie au milieu des sauvages. Or, il paraît évident, d'après lui, que ce missionnaire était un saint, un apôtre, un homme de Dieu, un véritable ascète. Le langage de l'abbé Bellemont, sulpicien fort remarquable, confirme en tous points l'opinion du supérieur des jésuites.

L'histoire Parkman ne fait que répéter en d'autres termes la véhémente diatribe de Francis à l'adresse du Père Rasles, mais il s'en tient là. Pas un mot d'éloge sur la vie édifiante du missionnaire des Abénaquis. Pourtant sa renommée comme historien impartial n'eût pas souffert, s'il avait eu le courage de parler plus franchement, à l'instar de Francis. Tous deux s'accordent à dire, avec Baxter, que le Père Rasles ne doit pas être considéré comme un martyr de la foi. Ils ont peut-être raison, mais leur appartient-il de décider une question dont ils ne peuvent être juges; ils n'ont ni mission, ni qualité pour cela. Il appartient à l'Eglise catholique seule de statuer en la matière. N'empêche que les catholiques ont bien le droit de penser dans leur for intérieur que le Père Rasles fut un martyr dans le sens large du mot, martyr du devoir, martyr de son dévouement à la religion, martyr aussi de son patriotisme. L'histoire de sa vie est là pour le prouver. Qu'est-il besoin d'avoir recours aux légendes et aux fables inventées sur son compte dans le but de le déprécier et même de l'avilir ? L'historien véridique et impartial ne peut puiser à ce fonds, parce qu'il est trop méprisable.

L'accusation la plus sérieuse que M. Baxter porte contre le Père Rasles, n'est pas neuve. Il n'a fait lui-même que rééditer pour la cen-

tième fois la vieille rengaine contre les missionnaires de l'Acadie, les Bigot, les Thury, qu'ils poussaient les sauvages à faire la guerre aux Anglais, à détruire leurs fermes, et même à les occire sans miséricorde. Qu'en savent-ils vraiment ? Est-ce parce que les gouverneurs de la Nouvelle-France entretenaient avec ces missionnaires une certaine correspondance, rendu nécessaire par les besoins d'information sur les agissements de ces peuplades dont ils avaient jusqu'à un certain point la charge et la direction comme catholiques ? Nous avons lu et relu ces lettres, et tout ce qui s'en dégage ne sort pas du domaine général des recommandations au sujet des Abénaquis et de l'importance de conserver leur amitié. Il est facile de comprendre que les gouverneurs comptaient plus que sur une alliance stérile avec ces sauvages qu'ils avaient maintes et maintes fois protégés; ils avaient besoin de leur appui pour soutenir les assauts répétés des Anglais. Le missionnaire était le seul homme qui pût réussir à réchauffer l'amitié et à maintenir une alliance dans toute son intégrité. Aussi s'y employait-il de grand cœur, croyant faire œuvre de patriotisme. Est-ce à dire pour cela que le missionnaire désirait la guerre et incitait les sauvages à l'entreprendre ? A quoi eût-il servi au Père Rasles d'engager ses chers Abénaquis à lever la hache de guerre ? Eût-ce été dans le but de servir les intérêts de la religion ? Hélas ! il ne le savait que trop bien: la guerre, pour les Indiens, n'était souvent qu'un prétexte pour assouvir leur soif de vengeance, exercer leurs cruautés sans nom, tuer, piller, etc. La religion catholique ne pouvait bénéficier de ces scènes de carnage. L'Eglise a toujours eu horreur du sang, car sa mission en ce monde est toute de paix, d'harmonie et de charité.

Le Père Rasles n'était pas un homme sanguinaire, comme quelqu'un l'a représenté, aimant à faire le coup de feu contre l'Anglais. Il était prêtre et missionnaire tout d'abord. Ses supérieurs ne l'avaient pas envoyé à Nanrantsouak pour aider les Français dans leurs combats, mais pour s'occuper de l'avenir religieux des Abénaquis. Vivant au milieu d'eux comme un anachorète, il n'avait d'autre ambition que de sauver leurs âmes par la prédication de l'exemple et de la parole. Il bâtit leurs églises, les décora de sa propre main, et travailla de toutes ses forces à adoucir leurs mœurs, à réformer leur éducation. Cette tâche était énorme. Réussit-il à la remplir au gré de ses vœux ? Nous ne le croyons pas, car c'eût été miracle autrement, étant données les dispositions d'esprit de ces sauvages à l'égard des Anglais, qui représentaient à leurs yeux un double ennemi, ennemis de leur religion et ennemis de leur race.

VI.—*Irenna la huronne.*

Par M. Pamphile Le May.

(Lu le 9 mai 1903).

I

LA CROIX

Irenna la huronne, alerte, gorge nue,
S'éloigne du wigwam. Chaque soir, quand la nue
Plane comme un oiseau dans l'air plein de frissons,
Elle se glisse seule à travers les buissons;
Effarée, elle fuit comme la biche souple.
Ounis aime Irenna la huronne.
— Un beau couple,
Avaient dit les vieillards assis pour le conseil.

* * *

Ounis est un chasseur. Il voit, dans son sommeil,
L'ours brun de la forêt et l'outarde des grèves.
Il voit des crânes nus et du sang dans ses rêves,
Car il est un guerrier, un fils de sagamos.

* * *

Souvent Irenna chante, et nul ne sait les mots
Qui tombent de sa bouche aux heures de la joie.
Accroupi sur des peaux plus molles que la soie,
Un Autmoin redouté vient d'annoncer à tous
Qu'elle parle en secret aux puissants Manitous.

— Les plaisirs de l'amour, le bonheur d'être mère
Couronneront bientôt sa jeunesse éphémère,
Et ses pieds suivront loin l'homme qui la soumet,
Ajoutent les vieillards fumant le calumet.

—Quels sont les Manitous que sa prière invoque?
On ne la voit jamais, ô sages! quand j'évoque,
Pour savoir nos destins, les bienveillants esprits,
Reprend l'Autmoin.
Et tous le regardent surpris.

* * *

Au wigwam de la vierge, à la dernière lune,
Ounis s'en est venu tout heureux, sur la brune,
Apporter les présents: des castors, des visons...
Ils furent acceptés. Sans peur des trahisons,
Ounis n'a pas revu sa douce fiancée.
Ainsi le veut l'usage.

* * *

Irenna, balancée
En sa frêle pirogue, au mouvement des eaux,
Vient aborder la rive, et, dans les verts roseaux
Son mocassin fleuri trace une longue raie;
Elle semble inquiète. A sa hanche serrée,
Une peau l'enveloppe avec un soin jaloux.
Songe-t-elle au plaisir ? songe-t-elle à l'époux ?

* * *

Sous le dôme embaumé des résineuses pruches,
S'assemblent, bourdonnant comme feraient des ruches,
Les parents, les vieillards et les chasseurs amis.
Pour la fête chacun dans son orgueil a mis
Des colliers à son cou, sur sa tête des plumes.
Cymbales et tamtams, comme un concert d'enclumes,
Font retentir les bois jusques au loin. Le feu
Pour le festin déjà s'allume. Et le ciel bleu
Regarde s'élargir, à travers la ramée,
Le nuage mouvant de l'épaisse fumée.
De sa hutte d'écorce enfin le jongleur sort,
Ounis l'avait prié de conjurer le sort
Et de paraître ensuite au milieu des convives.

Ounis, pour inspirer des tendresses plus vives,
S'est tatoué la face et les bras. Les stylets
Ont ciselé ses chairs de dessins violets.
Sous ces dessins grossiers que le caprice invente,
L'amour a l'air féroce et le rire épouvante,
C'est la beauté pourtant aux yeux de la tribu.
La laideur, c'est cet homme et livide et barbu
Qu'apporta dans ses flancs une grande pirogue.

* * *

— Moi, je sais composer une mortelle drogue.
J'en remplirai ma coupe et j'irai, sans trembler,
L'offrir aux hommes blancs qui sont venus troubler
Notre liberté chère et nos chères ivresses !
Chante l'Autmoin cruel, en nouant à ses tresses
Une plume d'aiglon qui tombait des vieux pins.

— Où donc est la promise ? .. Et ses yeux sont-ils peints,
Dit-il encor ?.. Ses yeux, son épaule, sa gorge ?
Le daim captif est là. C'est elle qui l'égorge.
Qu'elle frappe sans peur l'animal endormi,
Et sans peur ses enfants frapperont l'ennemi.

* * *

Irenna la huronne, alerte, gorge nue,
S'approche du wigwam, mais il est tard. La nue
Redescend lentement dans l'air plein de frissons,
Elle se glisse seule à travers les buissons.
D'où vient-elle ? Un bruit sourd monte sous les feuillages,
Son cou n'est pas orné de brillants coquillages...
Quelque chose pourtant flotte à son sein bronzé;
Est-ce de son amour le signe déguisé,
Ou de la Robe Noire est-ce la médecine?...
Les convives sont là. Son regard les fascine.
On dirait un serpent endormant les oiseaux.

* * *

La ramure légère, enlaçant ses réseaux,
Au-dessus du wigwam s'arrondit comme une arche,
Par un sentier de mousse Ounis s'avance. Il marche
D'un pas fiévreux, rapide, avec un air d'orgueil.
Il arrive et s'écrie, en franchissant le seuil:

— A la danse ! au festin ! la volupté commence ! "

Irenna paraît sourde à cette véhémence.
En vain le fiancé l'invite sur ses pas,
Des pleurs mouillent ses yeux, elle n'obéit pas.

Ounis s'avance alors, mais la vierge recule,...
Le jongleur à ses dieux parle selon le rite.
Tout-à-coup il s'écrie:
—Arrachez de son cou
Cet objet inconnu qui vient on ne sait d'où...
Le Manitou le veut ! "
Il clame et gesticule.
Ounis s'avance alors, mais la vierge recule....

— Ce talisman nouveau, dit-elle, c'est la croix !
Je t'aime, tu le sais, et tu m'aimes, je crois.
Ne te désoles pas. L'espoir que tu caresses
Ne sera point qu'un rêve, Ounis, si tu t'empresses...
Mais pourquoi ce frisson ou cet air abattu ?
La "robe noire" attend, va donc, Ounis... Veux-tu?

II

LA SURPRISE

Les vieillards ont siégé sous la forêt. Dans l'ombre,
Loin du " visage pâle " ont siégé les vieillards...
Les guerriers iroquois sont venus, en grand nombre,
Surprendre les hurons, pendant que les brouillards
Tendent leur voile humide autour de la bourgade.
Sur les eaux, sous les bois, dans la lueur qui fuit,
Glisse comme un serpent l'infernale brigade.
Elle guette sa proie. O ! la sanglante nuit...
La mort plane !
L'Autmoin a prédit la victoire.
Il a parlé deux fois à l'esprit des combats.
Les " blancs " auront leur tombe ici. Ce territoire,
Depuis le lac sans fin jusqu'aux monts de là-bas,
Est aux chasseurs. Les " blancs " et les hurons qu'ils aiment
Seront tous égorgés. Les Hurons les premiers,
Car ils déposent l'arc, fouillent la terre et sèment
Des grains qui vont mûrir au milieu des fumiers.

* * *

Les bois sont endormis. Le hibou solitaire,
Seul aux cîmes des pins, ulule tristement.

— O l'augure fatal ! ne va-t-il pas se taire ?
Songe Ounis, le guerrier, qui marche lentement.

Ounis souffre depuis qu'Irenna son amie
A reçu le baptême et prie un Dieu nouveau.
Sur son front désormais pèsera l'infamie...
Des pensers de vengeance échauffent son cerveau.

— De quel droit ce Dieu-là, gronde-t-il dans un râle,
Vient-il nous enlever les vierges de nos bois,
Nous ne lui volons pas ses femmes au front pâle?...

Il erre ça et là comme un fauve aux abois,
Honteux de son échec, irrité de sa peine...
Mais quelles sont ces voix qui chuchotent tout près?
Sont-ce les guerriers morts qui lui soufflent la haine ?
Il veut boire du sang... Le sang qu'il aime. Après
Il ira déterrer, lui, la hache de guerre.
Si les autres ont peur, qu'importe ? il ira seul.
Le wigwam d'Irenna qu'il respectait naguère
S'endormira bientôt sous un sanglant linceul...

Et toujours le hibou sinistrement ulule...
Interrogeant la nuit de ses ardents regards,
Ounis marche plus vite. Un feu maudit le brûle...
Il est fou d'avoir eu pour elle tant d'égards.

* * *

Irenna reposait sur sa couche de branches.
Un ange avec amour la protégeait, ouvrant
Au-dessus de son front ses ailes toutes blanches.
Elle se délectait dans un rêve enivrant.

L'ange ne voit-il pas la menace qui plane ?
N'entend-il pas un bruit pareil au flot montant ?
Qui donc s'introduit là, dans la chaste cabane?
Un spectre s'est penché sur la vierge. Hésitant,
Il écoute passer une haleine embaumée...
Ce grand Esprit, ce Christ au séduisant appel,
Ce Dieu qui lui ravit sa jeune bien-aimée,
Va-t-il à son amour, va-t-il à son scalpel,
Cette nuit, la soustraire ?
Elle est là sans défense.
Le père est à la chasse au loin. L'obscurité
Favorise l'audace et provoque l'offense.
On fait mieux ce qu'on fait dans la sécurité.

* * *

Mais quel cri de fureur, quelle clameur immense
S'élève tout-à-coup dans la bourgade en paix ?
Est-ce le cri de guerre ? Il meurt et recommence
Comme un éclat de foudre au fond des bois épais.
Le féroce iroquois, brandissant la massue,
Sourit au sang qui coule et foule aux pieds les morts...
Il frappe; il est partout et ferme toute issue.
Son bras est sans repos et son cœur, sans remords.

Ounis s'est redressé pareil à la panthère;
Aux appels des guerriers Ounis a répondu...

La vierge avait un songe .. O ! le chaste mystère !
Aux clameurs des combats le songe s'est fondu.

III

LE SUPPLICE

Les guerriers iroquois reviennent de leurs courses.
Ils chantent en voguant, et vantent les ressources
De cet esprit subtil qu'ils tiennent des aïeux,
Ils traînent des captifs. Ils sont fiers et joyeux,
Car toute la tribu va les appeler braves.
Les femmes, les enfants, avec les vieillards graves,
Vont descendre à la rive en foule, au-devant d'eux.
Leur bouche se contracte en un rire hideux,
Car ils ont inventé de nouvelles tortures.
Des cheveux tout sanglants pendent à leurs ceintures,
Les cheveux des guerriers ennemis.

Les canots
Glissent sur le flot noir comme un vol de linots.
Le chef, de temps en temps, jette une clameur gaie
En frappant rudement, du bout de sa pagaie,
Un jeune prisonnier à ses pieds étendu.
Le vainqueur n'aura pas longuement attendu
Pour voir mûrir ses plans et triompher sa ruse.
Mais que n'a-t-il fait plus ? Maintenant il s'accuse
De n'avoir pas versé tout le sang qu'il rêvait.
Avait-il peur des Blancs ? Les Blancs, oh ! s'il pouvait
Pendre comme un trophée à sa ceinture fauve
Leur courte chevelure ! Et, dans leur crâne chauve
S'il pouvait au festin, boire leur sang tiédi !

* * *

Et longtemps les canots, dans un élan hardi,
Emportant les vaincus et les fruits du pillage,
Ont tracé sur les eaux leur sinistre sillage.
Ils arrivent enfin. Louant Areskouï,
Le guerrier dans les flots jette, tout réjoui,
Le petun odorant qu'il offre en sacrifice.

* * *

Le sachem iroquois,—serait-ce un maléfice ?—
Le sachem déjà vieux brûle pour Irenna,
La fille des hurons qu'un guerrier lui donna.
Il brûle et veut l'avoir pour femme ou pour maîtresse.
Elle viendra bientôt, en sa grande détresse,
Pour la première fois au wigwam du chasseur.
C'est pour sauver Ounis. Elle se dit sa sœur...
Tous les deux ils mourront s'ils ne vivent ensemble.

* * *

A la clarté des feux la tribu se rassemble.
C'est l'heure du supplice. Alors le sachem dit:

— Jusqu'à l'autre soleil il vous est interdit
De tourmenter Ounis, le frère de ma femme.
Pour les autres captifs nul tourment n'est infâme."

* * *

— L'ardent foyer pétille et la chaudière bout.
Au festin ! .. .. Les captifs sont là, rangés debout,
Liés solidement au tronc rugueux du frêne.
Au festin ! .. .. Nous irons sur la sanglante arêne,
Et le huron mourra déchiré par les fers.
Les outrages anciens que nous avons soufferts
Seront vengés !

Ainsi parle un jongleur immonde,
Et le festin commence. Et tout ce cruel monde
Déchire de ses dents les morceaux de la chair.
Et l'enivrant fumet monte longtemps dans l'air
Avec les cris de joie, à travers le bois dense.
Puis au repas succède une infernale danse,
La danse de la mort.

— Le sais-tu, prisonnier,
Le soleil qui se couche est pour toi le dernier ?
Nos chiens vont dévorer, cette nuit, ton cadavre...
Guerrier, tu vas mourir ! guerrier, la peur te navre !

Ils dansent en chantant ce sinistre refrain.
Leur colère, bientôt, ne connaît plus de frein.
Ils balancent les bras, ils agitent la tête,
Ils poussent des clameurs comme des cris de bête.
Devant les prisonniers ils passent tour à tour,
Et leurs ongles, aigus comme des becs d'autour,
Les déchirent. Ensuite, au signal, l'arc se bande,
Et de cruels enfants, avec la noire bande,
Sur ces nobles vaincus lancent des traits perçants.

Et toujours garottés, les hurons impuissants
Jettent à leurs vainqueurs des regards pleins d'outrage.
Le sang qui coule allume une effroyable rage;
C'est la pourpre sans prix dont le bourreau se teint.
On attise la flamme au foyer qui s'éteint.
Les femmes font rougir des instruments de pierre
Et brûlent en riant l'insolente paupière
D'où sans cesse jaillit le mépris.

Les hurons,
En des éclats de voix qui semblent des clairons,
Provoquent leurs bourreaux:

—Bourreau, tu te relâches!...
Oh ! quel bonheur ! nos yeux ne verront plus de lâches !
Nos fils de vos aïeux ouvriront les tombeaux,
Pour vous donner ensemble en pâture aux corbeaux !"

Plus ils narguent la mort, plus aussi le sang coule...
Leur voix n'est plus qu'un râle et la vengeance est soûle.

Parmi ces fiers mourants Ounis est oublié...
Il est demeuré seul à son arbre lié.
C'est un malheur nouveau. Le supplice qui tarde
Est souvent plus cruel qu'un prompt supplice. Il garde
En son cœur ulcéré rancune à son destin.

S'il est sur le bûcher au lieu d'être au festin,
C'est l'amour inconstant d'Irenna la chrétienne
Qui l'a voulu... L'infâme! Au moins qu'on la détienne!
Qu'elle sache sa mort et ses ressentiments,
Et qu'ensuite elle meure au milieu des tourments !

IV

LA PROVIDENCE.

L'ombre a noyé les bois. Le silence environne
La cabane d'écorce où la jeune huronne,
Captive pour toujours, pleure en ses longs ennuis.
Elle ira dans l'instant, sous le voile des nuits,
Pour de tristes amours coquettement parée,
Sous la tente du chef. Le ciel l'a séparée
D'Ounis le beau guerrier qui possède son cœur.
Ounis ne cacha point un sourire moqueur
Quand elle lui parla du Christ et du baptême.
Maintenant sur leur tête est tombé l'anathème,
Puisque tous deux ils sont au pouvoir du vainqueur.

Des voix hurlent là-bas, d'autres chantent en chœur.
C'est le rugissement des bourreaux qui s'étonnent,
C'est l'hymne de la mort que les captifs entonnent;
Irenna, seule, pleure et maudit sa beauté.

La haine épuise enfin toute sa cruauté.
Tout bruit meurt. L'iroquois dort. Un rire farouche
Comme un reflet d'enfer passe encor sur sa bouche.
Mais le chef ne dort pas. Il espère, il attend.
Un murmure, un frisson, un souffle qu'il entend
Lui semblent le soupir de la superbe esclave.

Et voilà que s'allume une paupière cave;
Au bord du lac dormant un spectre est descendu;
Un cœur broyé gémit sur le bonheur perdu;
C'est l'altière Ondina qui cherche sa rivale.
Le sachem la renvoie, et, comme une cavale
Que l'éperon de fer tourmente et fait hennir,
La femme délaissée, à l'amer souvenir
Se révolte et bondit.

Les pénétrants aromes.
Les chauds baisers des nids sous les sauvages dômes,
La tiédeur de la brise et le calme des cieux,
Tout invite à l'amour.

Le chef est soucieux.
Elle tarde à venir, la huronne captive.
Aux douces voluptés son âme trop rétive
Hésite à se donner... N'a-t-elle donc pas bu
La magique boisson du chef de la tribu ?
Le jongleur, à minuit l'a fait sourdre du sable.
Cette boisson qui rend l'amour impérissable
Le Sagamo l'a prise; il s'en est enivré,
Et le feu court déjà sous son masque cuivré.

Les cadavres sont là. Béantes, les blessures
Saignent encor. Les loups font d'horribles morsures.
Ils ont flairé le sang et sont vite venus.
Et des corbeaux nombreux sur les os déjà nus
Ouvrent leur sombre vol d'où tombent des cris aigres.

Ounis le prisonnier cherche quels chants allègres
Pour braver les bourreaux à son tour il dira.
Comme un tigre blessé l'iroquois bondira,
Mais devant le héros ses fureurs seront vaines.
Le huron jettera tout le sang de ses veines,
Comme un défi mortel, au front de ces vils chiens,
Et, mort, il s'en ira glorieux vers les siens.

La huronne a passé sous la sombre ramure...
Sa joue a de l'éclat comme une pêche mûre;
Ses yeux, sous leurs cils noirs ont de fauves lueurs.
Repus, lassés du mal, reposent les tueurs.
Le wigwam du sachem est ouvert. Le chef veille.
Il veille en attendant la captive. O ! merveille !
Au bruit léger d'un pas, comme un timide daim,
Lui, l'homme sanguinaire, il tressaille soudain !
Lui, le fauve pétri d'une sordide fange,
Il sourit à l'amour comme ferait un ange !

* * *

La Huronne est venue... Elle est venue enfin!
Le bonheur sera long. Des ivresses sans fin
Vont remplir désormais l'âme du fier sauvage.
La captive oubliera les lunes d'esclavage...

* * *

Le lac n'a plus de chants, le bois n'a plus d'échos;
Tout dort, hormis les loups qui dévorent les os.
A travers les vieux troncs épars dans la nuit noire
Passe une forme svelte. Un long stylet d'ivoire,
Un stylet qu'elle agite et serre dans sa main,
Laisse tomber du sang le long de son chemin.
Elle court au hasard et comme une insensée.
Personne ne pourrait deviner sa pensée.
Elle va répétant, dans sa course, des mots
Qui tintent comme un glas aux voûtes de rameaux.

* * *

Devant la mort qui vient Ounis est impassible,
Mais il entend son nom et tremble... Est-il possible
Qu'un autre infortuné vive encor près de lui ?
C'est une ruse .. .. Oui, là, dans l'ombre une arme a lui !
N'importe, il n'a point peur, il ressent trop de haine.
L'arme se trompe-t-elle?... Elle coupe sa chaîne!...
Le malheureux captif reprend sa liberté.

* * *

Pour venger dignement sa race et sa fierté,
La vierge avait tué le chef impur et traître.

Elle suivit les pas d'Ounis. Tous deux au prêtre
Ils vinrent, au retour, faire ces longs récits.
Ounis avait des tons, des regards adoucis.

— Baptise-moi, fit-il, j'aime un Dieu qui pardonne."

Le prêtre dit:
—Ce Dieu l'un à l'autre vous donne."

Irenna, tout émue alors, le front penché,
Murmura lentement:
— Mon père, j'ai péché !"

VII.—*La Fontaine d'Abraham Martin et le Site de son Habitation.*

Par P.-B. CASGRAIN, Québec.

(Lu le 20 mai 1903).

Le nom d'Abraham Martin dit l'écossais, pilote royal du Saint-Laurent, nous reporte aux premiers temps de la colonie. Il figure dans le domaine de l'histoire de Québec, comme un personnage un peu en vue sous le nom de *Maistre Abraham*, et depuis 1854 on l'a fait revivre inopinément à propos des Plaines d'Abraham.

On sait que le pilote abandonna la vie de marin pour se fixer à terre, et il s'établit à Québec, dans la banlieue, sur le penchant du coteau Sainte-Geneviève, à l'endroit qui fut connu dès lors et appelé depuis vulgairement *Claire-Fontaine.*

Cette appellation continua après sa mort (1664) parmi ses héritiers, et même jusqu'après la conquête, alors que l'endroit devint communément nommé *La Fontaine d'Abraham Martin.*

Cependant cette fontaine ne nous paraît plus connue aujourd'hui puisque on s'en enquiert pour la trouver, et que personne ne répond à la question. *Bulletin des Recherches Historiques, nov. 1902, question 904.* La raison en est simple, c'est qu'elle a disparu de la vue depuis longtemps, par un changement dans la voierie. Elle a été oubliée, étant restée cachée sous une maison construite peu après la conquête.

Et de même qu'il a fallu chercher pour découvrir la *Fontaine de Champlain,* (*Cf. Canada-français, vol. 1, p. 466*), ainsi nous allons nous mettre en quête pour trouver l'endroit de celle d'Abraham Martin.

Nous aurons en même temps l'occasion de délimiter exactement, d'après la disposition actuelle du terrain, la pièce de terre qu'il possédait là, comme aussi de rappeler le nom véritable qu'elle portait et qui lui fut donné pour désigner son habitation.

Dès 1645 il avait commencé à défricher sa pièce de terre, et en 1648[1] il avait déjà bâti sa maison et une grange; puis il complèta son défrichement en entier, que ses enfants ne purent cependant conserver plus de trois ans après sa mort (1664), faute de moyens.

Cette propriété consistait en 32 arpents en superficie, et comprenait deux lots[2] en bois, dont 20 arpents lui provenaient du chirurgien

[1] L'acte de donation par Adrian *(sic)* DuChesne qui fut signé dans cette maison l'indique.

[2] M. Doughty fait erreur en la divisant en 3 lots, et en disant 2 donations, prenant la ratification pour une autre donation. *The Siege of Quebec, vol. II, p. 290.*

Adrian Duchesne, à qui ils avaient été départis et concédés en roture par la Compagnie de la Nouvelle-France le 9 juillet 1637, et qui en avait obtenu la ratification par titre confirmatif de la compagnie, scellé de son sceau, en date, à Paris, du 5 avril 1639; et Duchesne lui en avait fait donation, à la suite d'une promesse verbale à cet effet qui remontait à 1645, par acte authentique passé à Québec, devant M^tre^ Laurent Bermen, notaire royal, le 10 octobre 1648; titre qui fut dûment agréé et ratifié par la compagnie le 1er février 1652.

Et quant aux autres 12 arpents Martin les tenait aussi en roture et directement par don de la compagnie, qui les lui avait départis par le Sieur de Gand, son commis-général, ainsi qu'il est énoncé dans un procès-verbal de bornage et arpentage dressé le 4 décembre 1635 par Jean Bourdon, arpenteur royal, suivi de tradition et possession immédiates, mais sans autre titre que ce procès-verbal. Cependant comme cette concession demeurait sujette à la charge stipulée et bien comprise d'en prendre ratification de la compagnie, laquelle s'était aussi réservé de donner les titres, honneurs et redevances, le titre de cette acquisition n'avait pas sorti son effet vis-à-vis d'elle et restait ainsi en suspens, jusqu'à l'accomplissement de ces formalités requises et exigées. Martin demanda donc, par après, la ratification de cette concession, laquelle lui fut accordée par la compagnie le 16 mai 1650, sans autre désignation du fond que celle énoncée au procès-verbal ci-dessus, fixant la charge des redevances à douze deniers de cens par chacun arpent par an, comportant profit de lods-et-ventes, saisines et amendes.

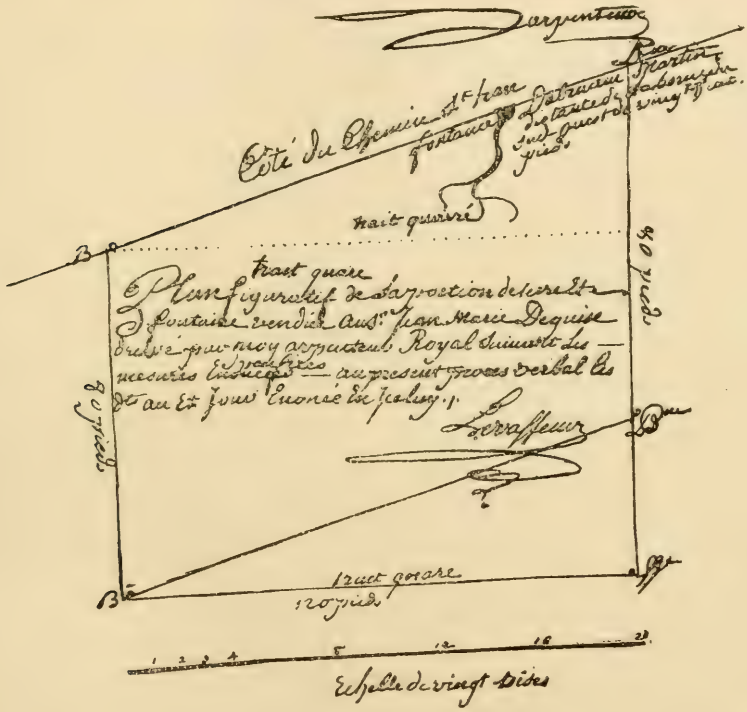
Le tout fut vendu aux Dames R.R. Mères Ursulines du monastère de St-Joseph de Québec, par les héritiers d'Abraham Martin et de Marguerite Langlois, sa femme, (au nombre de cinq, dont l'un était encore mineur) parce que les bâtiments tombaient en ruines et la terre restait en friche faute de moyens.

Ces motifs sont ainsi exprimés dans le contrat d'acquisition des Dames Ursulines passé en forme authentique devant M^tre^ Duquet, notaire royal, à Québec, le 1er juin 1667.

Comme il n'est pas fait mention, parmi les titres de propriétés des vendeurs énumérés en cet acte, de celui en date du 4 décembre 1635, tel qu'on le voit énoncé et décrit dans le procès-verbal de l'arpenteur Bourdon, à cette date, pour servir alors probablement à l'effet de titre par *interim* et sauf ratification, il est à croire, comme on l'a dit ci-haut, que ce document n'aura pas sorti son plein effet, puisqu'on y a suppléé par le titre subséquent de 1650, couvrant d'abondant les droits du concessionnaire et comportant le vrai titre.

Devenues ainsi propriétaires, les Dames Ursulines qui détenaient en simple roture, comme leurs auteurs, obtinrent l'érection en fief de cette petite étendue de terre, et on lui donna le nom de fief Saint-Joseph, situé en la haute-ville et *abanlieue* (sic) d'icelle.[1]

En cette qualité elles concédèrent en censive, le 22 mai 1762, à "Jean-Marie Deguise dit Flamand, marchand-tanneur, de Québec, "une pièce de terre faisant partie du dit fief, la dite pièce de terre "scize et située hors les murs de cette ville sur le chemin Saint-Jean, le "dit lieu nommé vulguerement (*sic*) Fontaine d'Abraham Martin, de



"la consistance de cent-vingt pieds de front sur le dit chemin Saint-"Jean, sur quatre-vingt pieds de profondeur allant vers le coteau "Sainte-Geneviève, aboutissant la dite profondeur aux terres encore non "concédées, joignant au nord-est aux terres non concédées, du côté du "sud-ouest encore des terres non concédées."

Cette concession fut faite à charge annuelle et perpétuelle de six deniers de cens, quinze livres tournois de rente foncière, et soixante livres tournois de rente constituée. Le contrat tel que stipulé appert

[1] Cf. Foi et hommages des Ursulines, vol. I, 1ère partie, p. 297, 1667, Reg. des Foi et Hommages.

au long dans le procès-verbal de mesurage et bornage accompagné du plan figuratif y joint, dressé le même jour, 22 mai 1762, par M^tre^ Noël Levasseur, arpenteur royal, en forme authentique et signé des parties, afin de servir, en même temps, de titre à Deguise.

Le plan figuratif indique "les bornes de la portion de terre et "fontaine vendues au dit Jean-Marie Deguise;" et sur l'alignement nord du chemin St-Jean, est marqué l'endroit d'une fontaine se déversant vers le coteau, avec l'inscription "fontaine d'Abraham Martin, dis-"tante de la borne sud-ouest de vingt-huit pieds;" ainsi qu'on peut le voir sur le fac-simile du plan photographié que nous présentons.

Plus tard Deguise désirant vendre se fit donner un titre plus effectif pour pouvoir transférer sa propriété, et les Dames Ursulines lui consentirent un contrat en forme probante, passé devant M^tre^ Panet, notaire, le 28 septembre 1765; et à l'instant le même notaire passa un second acte de vente par Deguise à Jean-Marie Liénard Durbois dit Mondor, maître-tanneur. La pièce de terre y est désignée tel que ci-dessus, au lieu vulgairement appelé Fontaine d'Abraham Martin, et "suivant procès-verbal et plan figuratif d'icelle faits par le Sieur Noël "le Buisson (Levasseur),[1] arpenteur, en date du 22 mai 1762, ensemble le procès-verbal d'alignement dressé par M^tre^ Lamorille, le 27 avril 1763".

Le chemin Saint-Jean d'alors avait été ouvert par l'ordonnance du Conseil Souverain du 20 juin 1667. Il passait dans la cour de la maison de feu Abraham Martin, après avoir longé un petit coteau à gauche et traversait ensuite les terres du Sieur de Repentigny et celles des Hospitalières. Son parcours était irrégulier et suivait les accidents du sol, comme le démontre l'angle prononcé de l'alignement du chemin sur le plan de Levasseur. Ce qui nous permet en même temps de fixer raisonnablement le site de la maison près de la *Fontaine.*

Mondor disposa de 40 pieds de front sur la profondeur ci-dessus, du côté du nord-est, en faveur de Chs Trudel, et vendit l'emplacement des 80 pieds restant à Joseph Belo dit Larose, par contrat devant M^tre^ Deschenaux, notaire, le 19 juillet 1784.

Le même cens, les mêmes rentes foncière et constituée, appuyés sur cet emplacement et sa subdivision, continuent d'être perçus par les ci-devant seigneuresses du fief, sauf que les rentes sont devenues maintenant rachetables à volonté depuis l'abolition de la tenure seigneuriale. C'est par ce moyen qu'on a pu identifier le site du terrain concédé en référant aux lots du Cadastre officiel du quartier Saint-Jean, n°s 3090, 3091 et 3092, appartenant à M. Hethrington, boulanger ;

[1] Françoise Levasseur, veuve de Jean-Baptiste Gosset de dit duBuisson, avait épousé Pierre Buisson, de là le surnom.

lesquels lots forment, avec celui voisin, n° 3089, l'encoignure ouest de la rue Sainte-Geneviève, en montant du coteau pour joindre la rue Saint-Jean.

La fontaine devait donc se trouver sur la propriété de M. Thomas Hethrington, n° 366 de la rue.

En effet, Mr. Hethrington, fils, a eu l'obligeance de nous donner, le 16 février dernier, les renseignements précis suivants:

"La fontaine existait, dit-il, sous le mur de fondation de l'ancienne maison où je suis né, et que nous avons rebâtie. Elle était couverte par une voûte en pierre, cintrée, large et assez haute pour y pénétrer facilement, comme je l'ai fait souvent dans mon enfance. Cette voûte était appuyée sur un mur très épais qui existe encore sous le milieu de notre maison, à une quinzaine de pieds de l'alignement actuel de la rue. L'eau se déversait vers le nord et coulait sans cesse, étant une source vive, très claire et très bonne. Lors de la pose des tuyaux de l'aqueduc et du gaz le drainage qui en est résulté a diminué l'eau. Dès avant la reconstruction, il y a une quinzaine d'années environ, la fontaine avait été comblée pour s'en débarrasser, parce que l'eau était devenue mauvaise à cause du développement du faubourg au-dessus et de l'infiltration qui s'en était produite dans les terres mal égouttées alors. Cependant elle continue toujours à couler un peu, si bien qu'il est nécessaire d'entretenir un canal qui déverse dans l'égout inférieur de la rue."

C'est à cause du redressement du chemin Saint-Jean et de l'alignement donné à la rue par Lamorille que la fontaine s'en trouve ainsi éloignée d'une quinzaine de pieds, et l'emplacement a gagné d'autant en front vers la rue, où il fait presque angle droit maintenant: ce qui démontre combien le chemin caracollait.

D'après les énoncés qu'on lit aux actes cités, on voit que l'eau de la fontaine était abondante et servait à alimenter une tannerie, où il y avait aussi un moulin à tan et une boutique. Cette industrie ayant commencé là en 1762, a été continuée longtemps, même après 1784.

Jetons maintenant un coup d'œil sur l'ensemble et les limites vraies, aujourd'hui, des 32 arpents de terre d'Abraham Martin, qu'incidemment il nous a fallu examiner.

Comme l'exactitude historique et géométrique ne saurait être trop minutieuse dans ces recherches et exposés, examinons attentivement le plan délimitatif qu'en ont donné MM. Doughty et Parmelee, au vol. II, p. 298, *The Siege of Quebec, etc.*, avec l'indication des limites comprises entre les lignes "A.B.C.D." et marquées "Claire-Fontaine Street," "Ste-Geneviève Street" et "St. John Street," avec une ligne

pointillée, près et au sud de la rue Saint-Jean, pour indiquer la limite sud.

Il nous parait évident que ce qu'il nous ont présenté comme plan est tout au plus une copie d'une copie approximative faite par feu M. le chapelain Maguire et que s'est un dessin récent à sa face, et postérieur à la conquête à cause de l'écriture en anglais. On peut le regarder comme un simple croquis qui peut donner un aperçu suffisant au lecteur pour localiser l'endroit; mais comme plan il est imparfait, et ne montre aucune marque d'authenticité. Il ne comporte aucune signature, et n'a ni rhumb-de-vent, ni échelle, ni mesurage, et l'indication de la rue Claire-Fontaine y est erronée.

Car il faut remarquer que quant aux dates qui nous occupent, savoir 1635 et 1667, la rue Claire-Fontaine n'existait pas là alors, ni depuis. Lorsqu'elle a été ouverte elle s'est arrêtée comme aujourd'hui à la rue Saint-Jean.

La rue Sainte-Geneviève était de même inconnue de nom et de fait en ces premiers temps.

Les tenants et aboutissants d'alors étaient du côté ouest, (N.N.O.). M. de Repentigny (Pierre Legardeur), 1667; et en mars 1668, les religieuses de l'Hôtel-Dieu; de l'autre côté au nord-est les héritiers du défunt M. Couillard, représentant feu M. Hubou;[1] au sud M. de Villeray, et au bout vers le nord la commune (s'étendant au pied du coteau).

En suivant une ancienne ligne fondamentale[2] de cette époque, la tirant droit dans le centre de la rue Claire-Fontaine et dépassant la rue Saint-Jean pour aller frapper la cîme du coteau, on retrouve la ligne ouest, borne originaire des 32 arpents. Elle est devenue aujourd'hui une ligne imaginaire, mais divise encore les mêmes propriétés des Ursulines de celles de l'Hôtel-Dieu. Elle est apparemment irrégulière sur le sol à cause des constructions qui biaisent sur elle et y font des empiètements réciproques, qui ont été accordés par de mutuels consentements.

Les autres bornes actuelles sont, vers le nord, la cîme du coteau Sainte-Geneviève, au sud-est, la rue Saint-Gabriel, et au nord-est la rue Sainte-Geneviève; lesquelles contiennent les 32 arpents. Voir notre plan bornes A.B.C.D. dressé par M. A. Taché, du bureau des Terres.

Nous n'avons pu trouver dans les anciens titres et plans aucun indice que ces 32 arpents aient jamais porté le nom de *Plaines d'Abraham*,

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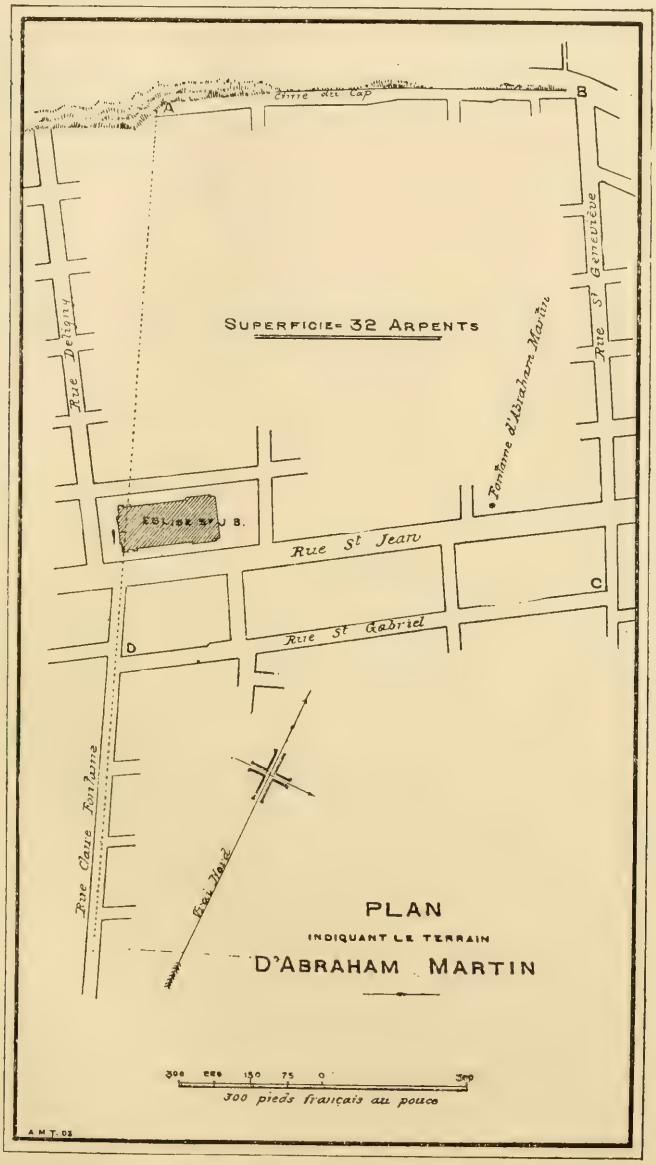
[1] Honorable homme, demeurant à la côte Sainte-Geneviève, décédé le 13 mai 1653, qui avait épousé Marie Rollet, veuve de Louis Hébert.

[2] Cette ligne part de la Grande-Allée, sur le sommet de la côte à Perrault, et suit le milieu de l'alignement de la rue Claire-Fontaine, droit jusqu'à la rivière Saint-Charles, au pied de la rue de la Couronne, et servait de ligne fondamentale de division des propriétés jusque-là. Elle coure 21°, ouest.

appliqué spécifiquement à ce terrain d'environ 5 arpents de largeur sur environ 6 arpents de profondeur. Cette petite superficie ne comporte



guère en elle-même ce qu'on entend en bon français, chez nous, par l'expression *plaine*, et encore moins de permettre d'employer le pluriel pour pouvoir dire les Plaines d'Abraham, en parlant de ce petit carré de terre. Ce que nous entendons clairement au pays par *plaine*, est

une étendue plus ou moins considérable de terrain *planche*, s'étendant de tous côtés sur une surface généralement égale, comme, par exemple, sur les hauteurs de Québec, le plateau dit des Hauteurs d'Abraham, à partir des Buttes-à-Neveu, entre Québec et Sillery. Il serait encore plus difficile d'appliquer ce nom à la côte ou coteau Sainte-Geneviève, sur lequel est situé le terrain d'Abraham Martin, à cause du manque absolu d'un même niveau; attendu que le versant du coteau va en pente rapide vers sa cîme. L'inclinaison forme là sur le coteau, rue Saint-Réal, une différence de 119.71 pieds avec le niveau de la rue Saint-Gabriel, c'est-à-dire une rampe de 1 dans 9 sur la profondeur des 6 arpents.

Quiconque croit qu'il pourrait y avoir là une plaine, n'a qu'à aller l'hiver voir glisser les enfants dans les côtes des rues sur ce versant, et s'assurer de la vitesse prodigieuse de leurs traîneaux. De là probablement le nom si ancien de côte Sainte-Geneviève.

Chose étonnante: Ce n'est que depuis 1854 (*Doughty, The Siege of Quebec, vol. II, p. 298,* citant Beatson), qu'on a fait la découverte que ce terrain a porté et doit porter le nom de Plaines d'Abraham, et était suivant MM. Doughty et Parmelee, "*the original Plains of Abraham.*" (*Id., pp. 291, 306.*)

MM. Doughty et Parmelee à ce sujet s'appuient sur l'autorité de feu l'abbé Ferland, que le capitaine Beatson a suivie et qui leur a été passée toute faite de ce chef, pour repéter tous quatre la même chose, sans plus ample examen.

Remontons aux sources pour contrôler d'abord l'abbé Ferland; ce que ces derniers n'ont pas fait et auraient pu faire aussi facilement que nous, en ce moment, d'une manière certaine et authentique, ayant eu en mains les mêmes pièces primitives et prenant la peine de les lire.

Personne ne contestera que le coteau Sainte-Geneviève s'étend depuis les murs, au nord de la porte Saint-Jean, jusque dans Sainte-Foye, formant le versant du côté nord-ouest du chemin Saint-Jean. C'est sur ce coteau et environ à 8 arpents des murs et juste au-delà de la rue Sainte-Geneviève qu'est situé le terrain de Maître Abraham.

Il est facile de s'apercevoir que l'abbé Ferland n'a pas vu ou n'a pas pu examiner attentivement les pièces originaires qui se rapportent à ce terrain. Ainsi il n'aurait pas mis *Marie,* une autre fille, femme de Jean Cloutier, au lieu de Marguerite Langlois, comme femme d'Abraham Martin. Il n'aurait pas borné le terrain vers le sud à la rue Saint-Jean, qui n'existait pas alors, même comme chemin de son vivant,[1] et il aurait vu que la limite de ce côté s'étend au-delà et jusqu'à la rue Saint-Gabriel d'à présent; il ne l'aurait pas borné à l'ouest à la rue Claire-Fontaine qui

[1] Il ne fut ouvert qu'en 1667 par procès-verbal du Conseil Souverain.

n'a jamais existé là et qu'il confond avec la rue Déligny, qui, dit-il, passe comme "Claire-Fontaine" devant l'Eglise Saint-Jean; il aurait découvert que le terrain ne s'étend pas aussi loin de ce côté; enfin il aurait lu clairement dans les divers titres cités, le nom distinct de *Claire-Fontaine* donné à l'habitation d'Abraham Martin et pas d'autre.

Où est-ce que l'abbé Ferland a appris que le nom de "*Plaines* "*d'Abraham* était autrefois appliqué à ce terrain, comparativement uni, "dit-il, qui s'étend du pied du coteau Saint-Louis jusqu'à la cîme du "coteau Sainte-Geneviève?" Mais c'est là même le coteau Sainte-Geneviève, et connu comme tel et non autrement de tout temps.

Pour ceux qui ne l'ont pas à vue de nez comme nous, Bouchette doit être la meilleure autorité; et si l'on veut référer à sa *Topography of Canada, 1815, pp. 430-465,* elle satisfera les plus incrédules, qui ne sont pas de Québec. D'ailleurs n'importe quelle carte de la ville indique ce coteau sous ce nom, à commencer par les plus anciennes, celles de Villeneuve en 1685 et 1688.

Les titres les plus anciens désignent tous l'habitation d'Abraham Martin sous le nom de Claire-Fontaine.

Nous allons établir qu'elle était connue comme telle, même de son vivant, et nommée ainsi par ses héritiers immédiats, et a continué telle par les Ursulines, leurs acquéreurs, qui ont toujours endossé tous leurs titres "*acquisition de la terre de Claire-Fontaine,*" jusqu'à aujourd'hui.

De même aussi d'après des anciens plans la terre de Martin est désignée *Claire-Fontaine.* Cf. Plan Levasseur, 1766, cités par Doughty & Cie, et autres plans.

Mais ce qui va encore plus directement en preuve c'est le témoignage par écrit des cinq héritiers Martin eux-mêmes, consigné dans les quittances respectives de leur part du prix de vente aux Ursulines.

Ainsi dans deux actes passés à Montréal, devant M^tre^ Basset, notaire royal, l'un du 3 juillet 1669, Nicolas Forget dit Despastys et Magdeleine Martin, sa femme, donnent quittance pour partie de leur part du prix; "à cause de la vente faite aux dites Religieuses par leurs "cohéritiers, *de la terre Claire-Fontaine,* située au dit Québec, et estant "de la succession des défunts Abraham Martin et Marguerite Langlois, "père et mère de la dite Magdeleine Martin;" Et l'année suivante, 21 mai 1670, ils accusent "parfait paiement pour leur part et portion "qui leur était échue de la terre *Claire-Fontaine.*"

Dans une autre quittance de Messire Charles-Amador Martin, prêtre, par acte passé devant M^tre^ Becquet, notaire royal, à Québec, le 16 août 1675, il reconnait et ratifie comme fils et co-héritier d'Abraham Martin et de Marguerite Langlois, la vente faite aux Ursulines des "trente-deux arpents de terre scis en la banlieue de cette ville au lieu

"dit Clère (*sic*) Fontaine avec quelques vieux bâtiments tombés en "ruine;" et déclare être payé de sa part du prix de vente.

Etienne Racine, comme ayant épousé Marguerite Martin, co-héritière, reconnait par acte devant le même Becquet, notaire, en date du 11 janvier 1668, avoir reçu le reste de leur part de la vente "d'une "terre et habitation scize en la banlieue de Québec au lieu dit *Claire-"Fontaine.*"

Jacques Raté, qui avait épousé (1658) Anne Martin, veuve de Jean Côté, aussi co-héritière, donne la même désignation *Claire-Fontaine*, dans la quittance du 14 janvier 1668, Becquet, notaire.

Jean Cloutier, comme ayant épousé l'autre cinquième co-héritière Marie Martin, repète de même: "Une habitation scize près cette ville au lieu dit *Claire-Fontaine*," le 20 janvier 1668, devant le même notaire.

Les Ursulines vendirent ensuite leur acquisition à Jean-Eustache Lanouiller de Boisclair, contrôleur de la marine et des fortifications en ce pays, par acte devant Louet, notaire royal, le 26 avril 1726, la désignant "trente-deux arpents de terre en superficie, "scitués en la banlieue "de Québec, *au lieu vulgairement nommé la Claire-Fontaine.*" Cette vente fut résiliée par les parties le 29 mai 1749, par acte devant M^tre^ Boucault, notaire, et la Claire-Fontaine retourna encore, sous le même nom, aux religieuses; et le même jour elles consentirent à ce de Boisclair un bail à ferme d'une partie du même terrain alors clos en pieux pour l'espace de neuf années. Ce qui nous amène à l'époque de la conquête et de là nous arrivons, comme on l'a vu, à 1765 et 1784, sans changer de nom.

Il faudrait donc détruire cette chaîne de preuve d'abord, puis en produire à l'encontre une autre de même valeur afin de justifier l'appellation des *Plaines d'Abraham* de l'abbé Ferland et celle d'*Original Plains of Abraham* de M. Doughty et consorts.

D'après ces prémisses nous sommes fondés à conclure que:

L'habitation d'Abraham Martin était de son temps bien connue, et nommée vulgairement Claire-Fontaine et pas autrement.

Que cette appellation a subsisté après lui jusqu'à la conquête et a même été continuée jusqu'en 1784.

Que la fontaine qui porte son nom était bien sur son terrain et est celle que nous avons trouvée et indiquée.

Que le petit carré de terre de 5 arpents sur 6, n'a jamais porté le nom de Plaines d'Abraham, nom qui n'a jamais, non plus, été usurpé par le terrain de Martin.

Que de fait cet endroit ne peut pas former topographiquement ce qu'on peut appeler une *plaine* ou encore moins des *plaines*.

Que le seul indice qui reste à ce sujet pour rappeler le nom et l'habitation d'Abraham Martin, est le nom de la rue Claire-Fontaine, laquelle aboutit à l'encoignure sud-ouest du terrain primitif; nom qui va disparaître pour être remplacé par celui d'avenue Perrault, suivant la récente ordonnance du conseil de ville. C'était ci-devant la route dite Claire-Fontaine, pour l'ouverture de laquelle les Dames Ursulines et de l'Hôtel-Dieu laissèrent chacune quinze pieds de terrain entr'elles en 1790; et c'était aussi l'ancien chemin pour arriver sur les hauteurs du Cap, en montant de la vallée Saint-Charles par la côte d'Abraham. De là, probablement, (?) le nom de *Hauteurs d'Abraham,* comme dominant le fond de terre qu'occupait Maître Abraham et par lequel on passait.

A l'époque de la conquête les Français les nommaient les Hauteurs de la ville, ou Hauteurs d'Abraham, et les Anglais ont dit " *The Heights of Abraham,*" en conséquence.[1]

Jusqu'alors nous n'avons pu trouver nulle part, la désignation de Plaines d'Abraham, qui nous semble comparativement récente. Nous sommes enclins à croire que la partie si bien adaptée à un champ de courses, à raison de sa surface unie, et qui a été depuis environ un siècle (1789) en usage comme tel, a fait naître le nom de Plaines d'Abraham, (Cf. DeGaspé, Mémoires, p. 467) qui se restreint depuis longtemps à ce champ de courses.

En tous cas rien ne parait prouver que le nom du pilote écossais, pas plus que son terrain, ont servi à illustrer ce qui est connu aujourd'hui comme le champ de bataille des Plaines d'Abraham. Il est vrai que les Français en déroute et fuyant la poursuite des Anglais ont passé là, comme ailleurs, pour se sauver et ont même pu s'y défendre; ce qui n'ajoute pas plus d'importance à ce terrain qu'aux autres du voisinage et jusqu'à la rivière Saint-Charles. Le terrain de Martin se trouve en arrière de l'église Saint-Jean et à près d'un mille du champ de bataille, c'est-à-dire du monument de Wolfe.

En écrivant une page d'histoire simplement sur la foi d'autrui et sans remonter aux sources et les étudier sérieusement pour s'assurer par soi-même, on s'expose à faire fausse route et à se voir appliquer l'adage: *Quot Graecia mendax scripsit !*

Il ne faut qu'un mauvais moment pour créer une erreur, et il faut des années pour la détruire. Et encore ! Témoin Kingsford et sa date de l'assaut Montgomery qui coure de par le monde.

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[1] Open ground called the Heights of Abraham. *Id. vol. VI, p. 27, Fragment of the Siege, etc.* Cf. aussi les divers plans anglais de l'époque.

ROYAL SOCIETY OF CANADA

TRANSACTIONS

SECTION II.

ENGLISH HISTORY, LITERATURE, ARCHÆOLOGY, ETC.

PAPERS FOR 1903

I.—*The Evolution and Degeneration of Party.—A Study in Political History.*

By REVEREND DR. N. BURWASH, Victoria College, Toronto.

(Read May 19th, 1903.)

In all countries enjoying either a democratic or a constitutional form of government the political party plays an important part. In primitive times a party formed around the person of a strong military leader was often the means by which the original liberty of the tribe or nation was lost and absolute government established. At a later period a revolutionary party was the means by which that liberty was regained. But in modern times the party is no longer an occasional or extraordinary agency, called into being at some great crisis, but a permanent and legally recognized part of the machinery of a free representative government. It is such to-day in Britain, in the United States of America, in Canada, in France and Germany and even in Japan.

In these cases the party is not the volcanic outbreak of resistance to oppression, but is the result of the fact that the people have a voice in determining the various issues which arise in their history; that they are free to discuss these issues, and to form and express their opinions thereon; and that they can finally give force to those opinions at the polls. The party is the voluntary association of citizens by the help of which public questions are thoroughly discussed, public opinion formed, such opinion on the one side or other propagated and finally made effective in legislation. Such association is absolutely necessary if public opinion is either to be intelligently formed or effectively expressed.

Our object in this study is not to follow the history of the various parties which have arisen in our own or any other country, or to trace their varying fortunes of ins and outs, or their changes of origin, growth and decay. It is rather to treat the party in politics as a species or type, and to determine the forces which contribute to its origin and healthy development. It is to study the laws by which those forces operate, as well as to follow the normal course of the development into the highly complex organism of the modern party. And it is finally to observe the evil influences which contribute to its decay and eventually result in its overthrow.

The method of such a study must, of course, be inductive; and as human nature is the same the world over, and the forces which govern the social or political evolution are universal in their operation, we may

draw our examples from the histories with which we are all familiar, those of Canada, Britain and the United States.

The first fact that meets us, one that lies on the very surface of those histories is, that a living party is created only by the occurrence of some new issue of considerable importance and always of widespread interest. We may adduce as examples the parties which divided the nation from Henry VIII. to Elizabeth, from James I. to Charles II., from James II. to George I. As during this period the constitutional liberty of England was only slowly taking form, the parties were largely revolutionary on the one side and absolutist on the other; but in every case the intense and persistent political life of the party was due to the importance of the issue involved and the widespread interest which consequently attached to it. Such issues occur only in the life of an active and progressive nation. Wherever the people have settled down into a stagnant traditional life, without ambitions or new interests, and things go on as they were, there can be no new creation or birth of party. It is a ripe issue, involving large interests on the one side and the other, intelligently grasped by the people, that possesses this power of giving birth to party life. A merely speculative question cannot constitute such an issue. Academic disputes do not move the people. An issue or question enters the field of practical politics only when it has first entered into the industrial, commercial, or political life of the people, or into their international relations, and so forces itself upon their attention. We doubt whether a case can be found in which an abstract principle formed the basis of successful party life. The issue must take concrete form. We may even go further, and say that it must propose a positive course of action under the circumstances, a definite policy. It is more frequently on the policy or course of action to be pursued than on the end to be attained that party division of opinion arises. The deeper and more permanent party lines, however, imply divergence of ends as well as of methods. The first party lines in the Province of Upper Canada were based on the divergence of Imperial and Colonial interests. The question was, should the country be governed from Downing street according to the ideas and convenience or interests of the Home Government? or by the voice of and in the interests of its own electorate? Such a divergence goes to the very basis of political life and creates a party line of division which may perpetuate itself through the entire national history.

The issue which draws the line of division between parties must be important and permanent as well as practical. It must touch great common interests of the people, interests which are essential to their individual or united well being, and which are continuous in their char-

acter. This is essential not only to the perpetuity of party life, but also to that force or energy which makes a party effective for its political function. A deeply earnest interest is necessary to strong healthy political life and even the most fiery or bitter party spirit is preferable from the moral point of view to apathy and consequent carelessness. Indifference is only less fatal to the welfare of the state than that selfish and corrupt individualism or sectionalism which makes the state the prey of the grasping and unscrupulous schemer.

An issue which is strong enough to awaken and sustain a strong healthy political life will generally result in the creation of two parties. This is especially the case among the Anglo-Saxon peoples who form their opinions with great definiteness and force of character. The French people, with their more delicate logical distinctions, may shade off from the extreme right to the extreme left into five sections whose boundary lines are not very clearly defined. This certainly gives more scope for individualism in political life which when pure and healthy may be a very useful characteristic. But in Anglo-Saxon politics it has passed into a proverb that "Every question has two sides." The two sides are not created by the abstract merits of the question itself; for could we at once apprehend the absolute truth of every question there would be but one opinion, and that the correct one. It is the slowness of the human mind to arrive at final truth that renders the conflict of party needful as the process by which that goal is reached; and it is the characteristic one sidedness or imperfection of the human genius which determines its view, from this side or that side, of each individual question. This characteristic habit or attitude is probably more moral than intellectual, a matter of feeling rather than of judgment. On the one hand we have the conservative spirit, attached to things as they are, cautious and critical, averse to all change, a lover of the ancient, the venerable and respectable. On the other hand we have the progressive spirit, delighted with the new, with brilliant imagination portraying it in gay colours, venturesome and idealistic, keenly alive to all the imperfections of the present order, and a worshipper of the millennial idea rather than that of hoary antiquity. Under the impulse of the one spirit progress will be slow but safe and solid. Under the other there will be constant activity and movement, but not unfrequently mistakes.

It is not necessary here to enter into the investigation of the various causes which produce this variety of mental attitude. Influence of physical environment, hereditary proclivities, social environment, education, and social, religious or political institutions, all have their influence on the final result, which is the foundation under the stimulus of some practical issue of two antithetic political parties.

One of the early stages in the foundation of parties is the definition of policy, principles, or platform. For the purposes of the successful politician, the simpler and more epigrammatic this is the better. A policy or platform condensed into one or two high-sounding words is wonderfully effective. A policy which is lengthy or hard to understand will thereby work its own defeat. "Protection for our infant industries," "A National Policy," "No taxation without representation," "The United Empire," are familiar examples. This is but a case of the tendency in all ages of the popular mind to condense its experience or convictions into some pithy saying which is the wit of one and the wisdom of many. The policy thus represents the fully conscious stage of political life, the point at which the individual elements are not only uniting into a living organism, but the organism is becoming conscious of its own existence and character.

Another of the early steps in the life of a party is leadership. In revolutionary parties this is naturally military in its character, and may often as the result of mere physical force change the character of the movement which it represents. A good example we have of this in the French Revolution and Napoleon. It began with the widest liberty as its watchword; it ended in the most extreme absolutism. Washington gives us the finest example in history of a leader who never attempted to step aside from the end for which he was called to power.

But the true constitutional leadership of party is that which aims at victory by intellectual and moral conviction and not by physical force. Such leadership demands a rare combination of natural endowments and acquired advantages. Wide knowledge, and strong understanding, the gift of clear, forcible and persuasive speech, tact in dealing with men, all contribute to successful leadership. But probably the moral and social qualifications are even more important than the intellectual. Such a man must command public confidence, or even personal affection. To this end the people must have come to know him, and he must have great power of moral or social attraction, a strong personality and personal influence. Recent years have given us conspicuous examples of such leadership—Gladstone, Disraeli, Lincoln, Bismarck, Sir John A. Macdonald, Sir Oliver Mowat. Such leadership is of immense immediate advantage to the cause of any party. And yet if the personal influence of the leader causes the people to lose sight of the issue which is the true life of the party, the death of the leader may easily mean the disintegration of the party. In true healthy political life men should never overshadow the principles which they represent.

The real business of the leader is to make the people understand the nature and importance of the principles which he represents and to

create the enthusiasm for them which leads up to the necessary action. For this purpose leadership in our day has two most important instruments, the platform and the press. Of these the platform is the more immediately powerful. It brings into effective operation not only the rational considerations by which the party position or policy is sustained, but also all the personal influence of the speaker, the force of his emotional nature, his power to transmit this to his audience, in fact the influence of the orator, which was so exemplified in Demosthenes and Cicero. Added to this is the contagious enthusiasm of the audience itself, reacting again on the speaker, and arousing him to the very highest exertion of his powers. But if this is the more immediately powerful agency, the press is far more permanently and more safely influential in its results. It affords opportunity for calm consideration. That which it presents can be reconsidered at leisure and deliberately weighed apart from the tumult of an excited assembly. This is also true of the leader himself. In the calm quiet of his study he can come far nearer to simple truth than under the excitement of the great public gathering. What he writes can be laid aside, reconsidered, improved, and finally presented as the very best. Nor is the process of selection confined to the man alone. The whole country will give its attention not to every one who writes, but to those who write that which is worth reading. To lead the people permanently to the truth the press has thus many advantages over the platform. And to these is to be added the fact that there is no limit to the constituency which it can reach. The physical strength of the greatest orator can reach only thousands where the press reaches millions. The creation of a party press becomes for these reasons one of the most important steps in its evolution.

Following the process of development especially in modern times we are led next to the subject of party organization. This branch of our subject is capable of almost indefinite expansion. It is at the same time a point of great practical interest inasmuch as here first appear those unhealthy influences which lead rapidly to degeneration.

The organization of a party may be of a very simple and of a perfectly legitimate and useful character. If any body of citizens are to co-operate in the effort to bring their convictions and the reasons for them to the notice of their fellow citizens, some form of organization is for this purpose indispensably necessary. There must be a meeting to arrive at a common understanding of their fundamental principles. Such a convention must have a chairman and secretary. It is but a step from this to a permanent organization for the promotion of these principles. To this organization are attached local branches in all parts of the country. To employ the platform and the press in the work of

this organization, it is often necessary to meet the expenses of speakers, writers and printing. All this is regarded as legitimate; but it is bringing us nearer to the sources of danger. The introduction of funds and of paid workers may easily be perverted as we shall see presently. But thus far the fundamental purpose of the organization, the formation of intelligent public opinion is unquestionably both legitimate and useful. Another object of the organization of the party, the selection of the candidates who shall represent the party in the election contest, is a necessary function under a representative system.

But when we turn to the next purpose for which party organization exists and for which it has of late years been greatly extended we have reached our most doubtful and dangerous ground. Is the personal canvass either by the candidate or the party agents legitimate or in the best interests of a pure and free representative government? Every schoolboy knows how ancient this practice is and how our very words "candidate" and "ambition" have been derived from it. But even in Rome did it not belong to the age of decline when the man sought the office and not the office the man?

Looking at it in our own day is the personal influence or solicitation of the candidate or of his agents at all a proper influence by which to secure votes? If I vote for a man because he is my friend or has made himself agreeable, or has taken the trouble to ask me, and not because I have a clear conviction that he represents a right policy, am I not as unfaithful to my duty, as if I had voted because he slipped five dollars into my hand? It may be said that only by such a personal canvass and by great effort on election day can the full vote be polled. Granted, but is the vote polled by such methods of any real service to the country? Does it express any political responsibility or any intelligent or honest conviction? Should not all such persons be left to disfranchise themselves? But we will return to this point when we come to consider the degeneration of party in politics.

The battle of party having been fought out at the polls, next presents itself on the floor of the legislative assembly; and there also the political party has its course of development.

Several important particulars differentiate this development from that of the party in the country, or among the electors. The result of the election contest has placed one party in possession of the offices of executive government, and has given them a certain priority in the preparation and presentation of legislation. The work of the governing party becomes thus constructive, that of the other critical. The work of criticism by no means excludes a positive policy directly opposed to that of the government, but the opposition are for the time being with-

out the power of making that policy effective. They can present it and record their votes and reasons in its favour, but with a view to future rather than to present success.

The issues on which the parties divide on the floor of the house are no longer confined to principles or matters of commanding importance, but are extended to minute and well defined legislative action. Many subjects of legislation are thus excluded from the category of party questions and are left to the exercise of individual judgment. It is the prerogative of the Government to choose their ground in bringing forward their programme of legislation, leaving minor matters to individual action. But even after this elimination the field of party issues is greatly enlarged in parliament. The discussion of these issues in parliament has a twofold purpose, justification and conviction. Probably the latter purpose is subordinate. On all party questions, the position of the party is carefully considered and practically determined before the matter is discussed in the house. The speeches are not so much to change votes as to justify the position taken before the country. This is especially true of great issues which have already been explained and considered in caucus. Those items of legislation which are less essential to the party principles and policy may be left for open discussion. That a man should leave his party on a great issue becomes thus a most important matter in parliamentary history and is scarcely ever the result of a discussion or of parliamentary oratory. On the floor of parliament the party thus assumes its distinct function and develops its organization to meet the requirements of that function. The principal elements in this organization are the parliamentary leaders, the whips and the caucus. By means of the caucus the leaders consult the whole body of their followers on important matters of policy. The whips are the agency by which the whole force of the party is made available for a division. Two leaders are recognized in the house, one of the government and one of the opposition, but under these are lieutenants who are intrusted with the defence of particular parts of the party policy as well as called upon for general support of the leaders. The members of the ministry holding seats in the house are, of course, identified with such leadership on the side of the government.

The party thus fully formed and organized has a definite period of historic life often extending through several generations, and sometimes perpetuating by means of its organization a degenerate existence after its formative principles have ceased to have any living efficacy.

Of the normal life of a party the living issue is the creative force, and this normal life is or should be governed by certain ethical principles. A man who takes upon himself the responsibility of being the

representative of his party especially in parliament is believed to have done so from honest, intelligent, and well tried conviction. Loyalty to his party principles is on this account expected of him as a public duty. He can only honourably be released from the obligation by the resignation of his position. In carrying fundamental principles into effect the individual member by his very union with the party submits his individual judgment as to ways and means to the decision of the majority. The very existence of party implies this distinction between principle and methods of its application. To change the principle is to reconstruct the party lines and leaves every man free. Compromise can only be applied to methods.

On the other hand the party owes it to its members to allow large discretion in all matters not affecting its fundamental principles. This is one of the most notable features of English political life and is one of the most important characteristics of wise leadership. Parties organized under the vital influence of those far reaching forces which run through all history, awake to all the new issues which arise in the course of national life and taking up a well defined position on those issues as a matter of honest conviction may perpetuate a healthy political life through many generations. But the secret of this perpetuation of a healthy party life lies in honest conviction. Any influence which brings about deviation from this, or which substitutes for this some other motive must eventually result in overthrow and is in itself a political corruption. The occasion for such degeneration to which we may now turn our attention, arises from the fact that every issue which arises in political life in course of time reaches its solution. The whole truth probably lies with neither party. But even in the extreme case of one party altogether right and the other altogether wrong, there comes a time when the wrong is put right and so the issue ceases. But in the meantime the men who compose the party which thus has attained to victory are a well organized body of men accustomed to act together, and possibly in possession of the reins of government. If new issues have arisen which have been adopted into their party platform a healthy political life may be maintained. But if such is not the case, it will generally be found that the solution of the issue has brought about a nearly even balance of parties, now composed of the ins and outs. It is conceivable that the ins may maintain a pure political life by an able, wise, and honest administration of public affairs, the central motive being the highest interests of the country. The opposition may do the same by watchful, honest criticism of the measures and administration of their opponents, the same unselfish motive governing them. But in such an ideal state of affairs it will be seen that the real life of party has ceased to exist. You have no longer

two living parties divided by a clearly defined set of principles, but the organized bodies of two parties whose living spirit has passed away. One of these bodies is in possession, the other not, and the struggle between the parties may become a mere struggle for power, not for principle. The moment this becomes the case the door is open for the entrance of corruption on both sides of the house. Under these circumstances the best men may be proof against the malign influences; but no party that the world has ever known has been so. So long as the party from honest conviction was engaged in contending for its principles, this very contention, a pure motive, exerted a conserving influence. It kept the party pure. A man who is working from honest convictions will scarcely employ dishonest methods. But when his principles have triumphed and when a generation succeeds to his place who have entered the organization by inheritance and whose convictions have not been called out by clearly defined issues the salt which kept the mass pure has lost its savour. In the struggle for place and power, men enter the lists who are quite unscrupulous as to the means employed for the attainment of their end, and the true, healthy political party degenerates into a corrupt struggle for victory.

It is no uncommon thing that in such cases the best men eschew political life and thereby the evil is rapidly increased. If the evil affected only one party the remedy would seem to be within easy reach. Turn the corrupt party out and bring in a better. But the form of political disease which we have been studying in almost every case affects both political parties alike, and effective remedy must be something far more radical than anything which can be brought about by the triumph of either party.

Another remedy apparently easily at hand is that all good men of all parties should forget the names, associations and conflicts of the past and unite for the purification of political life. One of the most recent and apparently successful examples of this has been the overthrow of Tammany in New York. But reasonable and direct as such a course may appear it presents several serious difficulties if not radical defects.

In the first place such a combination is not easily brought about. It requires something like the presence of a moral plague to awaken the body of even earnest and upright electors to action in such a case. Each party is wide-awake to the defects of its opponents and ready to denounce them most roundly. But that is a very different thing from the breaking up of old party lines, and associations and the construction of a new party for the purification of politics.

Again, such a party once formed and installed in power by its very success has removed its own *raison d'être.* The evil which called

it into being no longer exists, and only the remembrance of it remains to quicken the pulses of party life. I need not mention instances in our own political history which show us how quickly a great scandal as it appears at the time is forgotten. Energetic, permanent party life cannot be maintained on memory. A single generation at most will serve to obliterate the keen sense of wrong and danger, and then for lack of living issues the evil will again creep in.

The remedy which nature provides is the incoming of some new and important positive issue which creates anew a strong, healthy political life. Such an issue is very likely to arise out of the rashness and self confidence of the men whose corrupt course is degrading the political life. It is a fortunate thing for the country if they make such a mistake before the course of corruption has reached its extreme limit. Such questions as the clergy reserves and responsible government are samples in our own country sixty or seventy years ago. They not only created a strong, healthy political life and brought to the front our best types of Canadian statesmen; but they also gave us a period of remarkable freedom from political corruption.

But when in the enjoyment of a healthy and comparatively pure political life, can anything be done to secure its maintenance. This is a question of even greater importance than that of a cure. The solution of this problem must be sought at the very source of the evil. It is often said in a general way that we must raise the moral standard, especially in the political field. This is quite true. The improvement of public sentiment, the quickening of public conscience are all important and needful works. But they can only be brought about by slow evolution. The life of a whole generation is needed to accomplish even the least appreciable result. The downward movement in the field of politics is of a much more rapid character. It does not wait for a whole generation of citizens to become morally corrupt. It can find the material for its purpose, *materies morbi,* in any ordinary generation of men and if the circumstances are favourable its progress is very rapid.

The first step in the course of political corruption is the substitution of party or personal thirst for power for honest party or personal conviction as to principle. The next step plunges both politician and party into the corrupt and mercenary struggle for the loaves and fishes. The next step is not the securing of the regulation loaves and fishes, but the plundering of the country. If this process of degeneration is to be prevented we must guard the first step. Strong constitutional limitations must be placed on the personal and party ambition. The distinction must be clearly drawn between personal and party ambition and zeal for honest even though mistaken convictions. We cannot, of

course, read the hearts of men and human laws cannot control motives. We can only deal with acts. The political activity that arises directly from zeal for convictions is limited to efforts to disseminate truth, by discussion, by voice and pen. The most radical and effective remedy that we can suggest for political corruption is to make all and every form of personal canvass or propagandism which goes beyond the public dissemination and discussion of opinions illegal.

We are well aware of the objections which would be raised to such an election law. Political convictions are disseminated, not merely by the press and public meetings, but also by private discussion. Granted, and granted also that the private discussion of public affairs between individual citizens should not be in any way discouraged, but rather promoted, yet to exclude a mere personal canvass by the candidate, to exclude house to house canvass by agents, and especially to exclude the introduction into a riding of outside people for such a canvass would imply no limitations of the individual liberty of the citizen and would remove the opportunity for a great deal that corrupts modern politics.

KRIS OF THE LAKES
LAKE BOURBON
Fort Bourbon
R. Bourbon
Lake des Forts
NEW SOUTH WALES
Lake des deux Decharges
Eyuan R & Bay
Great Muddy Riv.
Little Muddy R.
Fort Dauphin
Detroit
La Tete de Bœuf
Lake Quinipigon
Meadows Lake
Meadows
Great Clay R.
KRIS named also CHRISTINAUX and KILLISTINS.
High-lands
L. Quitchouan or St Anns L.
Albany
Viners
Kenaba R.
Hinds I.
Fort Rouge Red Fort abandoned
Fort Maurepas
Onefsipi or Maurepas R.
Mitkoucfsipi or Red R. the course of which is uncertain
Os R.
Swans L.
Carrying Place
Fort le Reine
Queens Fort
ASSINIBOELS OF THE SOUTH
Meadows
Woods L. or Minitie
Fort St Charles
Massaiere
Savanne Carrying place
Pt des Bois Forts
MONSONIS
NATION OF THE BEAR
Raip Lake or Tekaniaugon
Ft St Pierre
Flat R.
Long Lake
Ft Kaministiqua or the 3 Rivers
Nakouagan or Grassiers R.
L. Sefa Kmaga
Vermillion R.
Carrying Place
Red Lake, or Mitsifacaigan
R. du Fond du Lac
Nasbulepouan
Lands Height
St Charles R. the extent of which is uncertain
The Warriors Track from the River of the Wes
NATION OF THE SNAKE
Pike Lake
NADOUESSIS OR SIOUX
Missisipi R.
Fall of St Anthony
L. Pepin
Portage R.
Trisbeau R.
R. St Croix
Fort destroyed
Ruguvilla R.
Ouamalaminies
Pigeons Bay
Lake Alemipigon
Alemipiscouki Riv. with 7 Falls
Otter Head
Michipicoten Bay
Maurepas I.
Pontchartrain
Horquan
I. St Ann
I. Sauchemes
Minong Isl.
I. Royal
Alexandrin Pt
Great I.
LAKE SUPERIOR
The 12 Apostles
St Michel
OUTAWAIS
Old Settlement
Nequan Bay
St Mary
Fall of St Mary
Michipicoten
Tonnerre
Sault Ste Marie
R. Perro

II.—*The Lake of the Woods Tragedy.*

By LAWRENCE J. BURPEE.

(Communicated by W. Wilfred Campbell, and read May 19, 1903.)

All students of early Canadian history are of course familiar with the general outlines of that most tragic incident in the search for the Western Sea—the murder by the Sioux of the eldest son[1] of Pierre Gaultier de Varennes, the Sieur de Lavérendrye, with the Jesuit missionary Aulneau, or Auneau,[2] and a score of *voyageurs*, on an island in the Lake of the Woods. None of the English histories of French Canada, however, contain more than a passing reference to the affair, and the French-Canadian historians are not much more explicit, with the exception of Benjamin Sulte. It has, therefore, seemed worth while to bring together such evidence as is now available,—the original documents, whether in manuscript or print,—so that we may have before us, in convenient form, the fullest possible details of the occurrence.

The Sioux having done their work with characteristic thoroughness, no survivor remained of Lavérendrye's party to carry an authentic account of the matter to the nearest post; and the Indians themselves showed a perhaps natural reluctance to enter into details. Consequently, the evidence we have is more or less indirect and circumstantial.

What may be considered the official account is contained in a letter from the governor, Beauharnois, to the French Colonial Minister, dated 14th October, 1736.[3] This is based on the elder Lavérendrye's report, and upon a statement made by one Bourassa,[4] a *voyageur,* who had met the same party of Sioux on the day of the massacre.

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[1] The Sieur Vérendrye had four sons. The eldest, here referred to, was Jean-Baptiste, born at Sorel, in 1713. He had taken an active part, under his father's directions, in the search for the Western Sea.

[2] For full particulars in regard to Father Aulneau, see *The Aulneau Collection,* 1734-1745, edited by Rev. Arthur E. Jones, S.J., and published by St. Mary's College, Montreal, 1893. As to the spelling of the name, Parkman and most of the other historians spell it Anneau. Mr. Benjamin Sulte says Auneau is the preferable spelling, but that Aulneau is almost equally good. There does not appear to be any sufficient authority for spelling it Anneau.

[3] Lettre de Monsieur de Beauharnois, à Québec, le 14 octobre 1736. See *Canadian Archives*: Postes des Pays de l'Ouest, 1679-1759. (Vol. 16), F. 126, pp. 335-339.

[4] It is difficult to place this man. He is never referred to, except as one Bourassa. Mr. Sulte is of opinion that he was probably a grandson of the first Bourassa, who came to Canada from France in 1684. *See* Tanguay.

Beauharnois reports Lavérendrye's arrival at Fort St. Charles,[1] after an enforced wintering at Kamanistiquoya; the illness of Lavérendrye's nephew, La Jemeraye; and Lavérendrye's suggestion that a new post should be established to the south of Lac des Prairies, which was thought to be a very advantageous situation for the fur trade; and then he goes on to say:—

"He (Lavérendrye) wrote me from the same place (Fort St. Charles) on the 8th of the same month (June, 1736), and he informs me that the canoes had just arrived from Kamanistiquoya, and that they had not met the party which had left on the 5th for Missilimakinac, led by his eldest son, and amongst whom were Father Auneau and twenty-two hired men. He . . . conveys to me his fear that this party was exterminated by the Sioux of the Prairie.

"I have since learned, monseigneur, that the party had been totally destroyed by these Indians, and here are the particulars of the occurrence. You must remember, monseigneur, that during the year 1734, Sieur de la Veranderie gave me a memorandum to be sent to you, which memorandum you approved last year, and in which he speaks to the Indians in the following terms:—"I am not opposed to your waging war against the Maskoutins Poüanes, your enemies." In the same memorandum it is stated that he gave them his son to lead them."

Lavérendrye's son did accompany the Indians, in their expedition against the Maskoutins Poüanes, but only for a short distance, when he returned to the fort. The Maskoutins Poüanes, however, discovered his trail, and attributed to him the leadership of the hostile party. This, in the opinion of Beauharnois, was the immediate cause of the subsequent massacre.

"After having carefully read," continues the Governor, "the memorandum of the Sieur de la Veranderie, I enquired from some old *voyageurs* who the Maskoutins Poüanes were. They told me that they were the Sioux of the Prairie. I immediately understood the misfortune which had taken place, and gave him (Veranderie) strict instructions not to send in the future any more French to war against

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[1] In a letter from Father Aulneau to Father Boivin (*Aulneau Collection*, p. 72), he gives this description of Fort St. Charles:

"It is merely an enclosure made with four rows of posts, from twelve to fifteen feet in height, in the form of an oblong square, within which are a few rough cabins constructed of logs and clay and covered with bark."

Father Jones, who edits these letters, adds the following footnote:—

"The probable site of Fort St. Charles was a few miles up the bay now known as "North-West Angle Inlet." At the entrance of this bay, which begins at American Point, lies Gucketé Island. The latitude of the fort would be about 49° 6′, and its longitude west of Greenwich 95° 4″, or perhaps a few minutes further west."

this nation, nor to incite any Indians of his post to take part; that his orders were to maintain the Indians in peace, union and tranquility. . .

"I made enquiries with regard to what took place, and learned that the Indians at the post of the Sieur de la Veranderie had fired upon the so-called Maskoutins Poüanes, who had demanded: "Who fired at us?" They answered: "The French." They immediately resolved to be revenged, and had recourse to all the usual means to carry out their intentions, notwithstanding the fact that the Sieur de la Veranderie had not been concerned in the affair. This act produced in fact the same effect as if he had been there himself.

"At the beginning of the month of June last (1736), a party of Sioux of the Prairies, to the number of one hundred and thirty men, found the canoe of Father Auneau, in which was one Bourassa. They captured all the French, and tied the leader (Bourassa) to a stake to burn him. Fortunately for him he had a slave belonging to this nation, whom he had taken from the Monsonés. She said to her people: 'My kinsmen, what are you about to do! I owe my life to this Frenchman. He did nothing else but good to me. If you desire to be avenged for the attack which was made upon you, all you have to do is, to go a little further on and you will find twenty-four Frenchmen, amongst whom is the son of the chief who killed your people.' They released Bourassa and his men, and went and totally exterminated the other party.

"This is, monseigneur, an unfortunate affair, which may perhaps be the cause of the abandonment of all the posts in this (western) country."

This letter of Beauharnois', dated 14th October, 1736, was, as already stated, based partly upon a report from the elder Lavérendrye. Unfortunately, however, the report (mentioned in Beauharnois' letter as of date the 8th June, 1736), is not in the Archives at Ottawa, nor, indeed, does it appear to be extant elsewhere. Although I have made a most minute search through the calendars of French Colonial documents published in the Canadian Archives Reports, no reference can be found to it there. Parkman, in a footnote on page 33 of *A Half Century of Conflict,* Vol. II., gives the following original documents as bearing on the Lake of the Woods incident :— "Beauharnois au Ministre, 14 Octobre, 1736; Relation du Massacre au Lac des Bois, en Juin, 1736; Journal de la Vérandrye, joint à la lettre de M. de Beauharnois du Octobre, 1737." He, however, makes no mention of Lavérendrye's letter to Beauharnois of 8th June, 1736, which would appear to have conveyed the first intimation of the massacre, or rather Lavérendrye's fear that such a massacre must have taken place, for as yet he had no direct proof of it. It is most

improbable that, if the letter of the 8th June was among the documents in the Colonial or other Archives at Paris, it would have escaped the notice of Parkman, and also of the late Mr. Marmette and of Mr. Richard, who, on behalf of the Canadian Archives, made exhaustive searches through the Colonial papers in the various departments of the French Government for anything that might have a bearing, direct or indirect, upon the history of New France.

The other document mentioned as forming the basis of Beauharnois' report—the Relation of Bourassa—is, however, in the Canadian Archives. It reads as follows:—[1]

"A *voyageur*, Bourassa by name, relates that on June 3rd, 1736, having set out the fifth (of the band) from Fort St. Charles, at the Lake of the Woods, for Michilimakinac, met the following morning, just as he was about to push off from shore, thirty canoes manned by ninety or a hundred warriors, who surrounded and disarmed him and his companions, and plundered their stores. When they had learnt from him that under the curtain[2] of Monsieur de la Véranderie's Fort there were five or six wigwams of Cristinaux, against whom they had set out on the warpath, they released him, and departed with the intention of capturing the encampment. They told Bourassa, however, to wait for them, and at their return they would restore his arms. This he did not think advisable to do; on the contrary, he hurried to Michilimakinac, while the Sioux, on their side, pushed on to Fort St. Charles, where they failed to find the five wigwams of Cristinaux who had decamped, so they retraced their steps.

"Meanwhile, twenty *voyageurs*, who had lately arrived from Lake Alepimigon, were on their way to Michilimakinac. At a day's journey from there (Lake Alepimigon)[3] they were met by that same band of Sioux, who massacred them all.

"Among the slain were the young Sieur de la Véranderie and Father Auneau, the missionary.

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[1] This document is entitled "Affaire du meurte de vingt-un voyageurs arrive au Lac des Bois, au mois de juin 1736." A copy is among the MSS. in the Canadian Archives: Nouvelle France, Vol. 16. Postes des Pays de l'ouest, 1679-1759, pp. 340-343.

[2] The *curtain* is the line of enclosure between two bastions.

[3] The writer of this report was evidently somewhat at sea as to his geography. A reference to the accompanying map will show that Lake Alepimigon (the modern Lake Nepigon) is north of Lake Superior, while the Lake of the Woods is a considerable distance to the westward—certainly a number of days' journey as men travelled in those days. In any case, the *voyageurs* were travelling east, and therefore could not possibly have come from Lake Alepimigon to the Lake of the Woods. As a matter of fact, they had come from Fort St. Charles, on the western side of the Lake of the Woods.

"Their bodies were discovered and identified by a party of Frenchmen who passed by the same place a few days later.[1] Their heads had been placed on robes of beaver skin, and most of them with the scalp missing. The missionary was kneeling on one knee, an arrow in his side, a gaping wound in the breast, his left hand resting on the ground and his right hand raised. The Sieur de la Véranderie was stretched on the ground, face downward, his back all hacked with a knife; there was a large opening in his loins, and his headless trunk was decked out with garters and bracelets of porcupine quills.

"It will be only this year that we shall be in possession of the other particulcars of this unfortunate affair.

"Some are of opinion that the Indians wished to wreak their vengeance more particularly on young La Véranderie, the son, who two years before had joined a war party of Christinaux against the Sioux. It would appear that in the council he had been proclaimed leader. Be that as it may, the young man had desisted and had not taken part in the hostilities.

"According to Bourassa, the bulk of the attacking party was composed of the Prairie Sioux, of some Sioux of the Lakes and of Monsieur de la Ronde's post. The latter appeared well disposed towards the French; perhaps they were overruled in the affair of the Sieur de la Véranderie's murder. If the Sioux of the Lakes conspired with the Sioux of the Prairies to shoot the French, then there is much to be feared for the Sieur St. Pierre, who is commandant at the post of the Sioux[2] The Sioux nations are the fiercest of all the native tribes. They have been from time immemorial at war with the Cristinaux and the Assiniboels. These latter were originally from the same stock; they speak very nearly the same language, and yet they are irreconcilable enemies. A circumstance which the same Bourassa reports is, that the Sioux complained to him that the French supplied the Cristinaux with arms and ammunition. The Cristinaux might as well complain of the French furnishing the Sioux with ammunition.

"The Sieur de la Véranderie writes that, grief-stricken at the loss of his son, he intends placing himself at the head of the Cristinaux and Assiniboels, and of marching against the Sioux (an extreme measure and not to be recommended). He would do better to agree to give up the post of the Western Sea, or have another officer

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[1] Pierre Margry, in an article in the *Moniteur* (Paris, 1852), says that the discovery of the murdered man was made by five Canadian *voyageurs*, several days after the event.

[2] Fort Beauharnois, situated on Lake Pepin, about forty miles southeast of the present city of St. Paul.

appointed to relieve the Sieur de la Véranderie, who could undertake the task of conciliating all the tribes."[1]

Under date of the 14th October, 1737, Beauharnois again writes the Colonial Minister,[2] forwarding an extract from the Journal of the Sieur de la Véranderie, containing a fuller account of the circumstances which led up to and surrounded the Lake of the Woods tragedy. The extract is as follows:—

"During the month of June, 1736, this officer held a meeting at Fort St. Charles, Lake of the Woods, as to the mode of obtaining provisions and ammunition, and it was resolved unanimously to send three canoes to Kamanistigoüia and thence to Missilimakinac. To this end Sieur de la Véranderie distributed powder and bullets to those who were to take part in this journey, and Father Auneau, Jesuit, along with the eldest son of this officer, left on the expedition.

"The officer in question received during the same month of June, a letter from Sieur Bourassa, informing him that having been met by the Sioux they pillaged all that he possessed, without, however, causing him any personal injury, and upon his asking these Indians why they were taking him in custody, being good friends and brethern, they answered that it was the custom of warriors not to recognize anyone on their path.

"The party which had gone to Kamanistigoüia and Missilimakinac not returning when due, Sieur de la Véranderie sent Sieur Gras[3] with a canoe and eight men commanded by a sergeant, to go and meet the expedition, but the sergeant having returned on the same day, reported that those forming part of the expedition had been massacred; that the great majority of the bodies had been found decapitated, and lying in a circle one next to the other, the heads being wrapped in beaver skins. Amongst the dead were found Father Auneau and the eldest son of Monsieur de la Véranderye. An account of this adventure was given last year, though at that time it had not, however, been confirmed.

"During the month of August following, two Monsonis Indians having gone around the Lake of the Woods, found two canoes belonging to this party, with more than twenty Sioux canoes, fastened together two by two, and in which there was a great quantity of blood. The two Indians, moreover, found human limbs which had been buried

[1] This translation is taken from *The Aulneau Collection.*

[2] *Canadian Archives* MSS. Nouvelle France — Postes des Pays de l'Ouest. 1679-1759 (F. 126), pp. 349-367.

[3] The Sieur Gras (or Legras) mentioned here would appear to have been one of the sons of Jean de Gras (b., 1656), a merchant, of Montreal. This is the only family of the name mentioned by Abbé Tanguay in his *Dictionnaire Généalogique.* Mr. Benjamin Sulte is of the same opinion. *See* Tanguay, p. 372.

in the sand, and this left no doubt that the Sioux had also lost some of their number.

"The news of this adventure having got abroad, Sieur de la Véranderie was visited by delegates from the Cris and Monsonis, who informed him that during the following autumn the chiefs of their nations would come to him in order that, with him at their head, the blood of his son and that of the other French that the Sioux had killed, might be avenged; to which Monsieur de la Véranderie replied, thanking them and telling them that it would be necessary to await the orders of their father as to what course should be followed, and that after these had been received, he would inform them of it.

"A few days afterwards the Cris and Assiniboels assembled at Fort Maurepas, and sent twelve of their number to Sieur de la Véranderie, to ascertain if it was his intention to go and avenge the death of the French, and especially of his own son, whom their nation had adopted as their chief; that they were still mourning his death: that a portion of their warriors would proceed to the point below the fort which is their common meeting place; and that they had the hope of seeing him himself or one of his children at their head to march against the Sioux, or that at least he would send them a canoe with powder, bullets and tobacco.

"Sieur de la Véranderie having held counsel with the great chiefs of the Monsonis and Cris, they commenced by bewailing the death (of the French), and the Indian chiefs proposed to Sieur de la Véranderie to send expeditions against the Sioux, but upon considering that this would interfere with the autumn hunting, and also with the harvesting of the wild oats, and upon the representations of Sieur de la Véranderie, that owing to the limited number of canoes provisions were scarce, it was decided not to undertake the expedition. But this officer proposed at the same time to the chiefs of the two nations, to send word to the Monsonis of Lake Tekamamiouen to the effect that after having met together, they should go every year to meet the convoy of the French and escort it with fifty men, which they would furnish, in order that they might not be exposed to the insults of the Sioux. This was unanimously accepted and was carried out during the autumn of last year.

"Monsieur de la Véranderie, as a mark of gratitude, gave to the chiefs of these two tribes a collar to be kept by them, the one given to the Monsonis, at Fort St. Pierre, and the one given to the Cris, at Fort St. Charles, Lake of the Woods.

"This officer, moreover, promised to the Indians some tobacco, powder and also bullets, which would be delivered to them in the spring and autumn of each year.

"Towards the end of the month of September following, Sieur de la Véranderie received two delegates coming from the Cris and Assiniboels, who asked him on the part of their nations, to send canoes to their tribes in order to supply their needs. This officer granted to the delegates a canoe manned by six men and under the command of one of his children, who was escorted by the Indians as far as Fort Maurepas, and he gave his son instructions for his guidance that he might acquire knowledge during his voyage.

"One of the principal things which he recommended to him was to explore the Ouachipouannes, otherwise called the Koüatheattes, a white and civilized people who cultivate the land and live in forts and houses, and who, according to the knowledge of the Indians, lived at a distance of not more than one hundred and fifty leagues from Fort Maurepas; to induce these people to send to Fort Maurepas delegates of their nation, in order to form an alliance with the French; and to tell them that, when one of their number had come the winter before, the commandant had only been informed of the fact after his departure, which had been for him a cause of sorrow as well as for the other French.

"Sieur de la Véranderie added to these instructions to notify the Assiniboels and Cris to be at their fort during the month of January following, and that he would explain to them there the instructions of the Great Chief of all the French.

"During the month of October following, a great number of Indians, Cris, Monsonis and Assiniboels, came to Monsieur de la Véranderie, and the chief of the Cris, who was the spokesman of these nations, after having shown how their tribes were sensible of the accident that had occurred to the French, proposed to him again to come at their head to avenge the dead. They represented that they were very sorry that their death had retarded the establishment of a fort which they had promised to them at the far end of Lake Ouinipigon, where they could have found the subsistence of their families.

"The chief asked, lastly, that he would leave with them to spend the winter at Fort Maurepas one of his children, and to allow them to adopt his son the Chevalier as their chief, in the place of his brother whom they had lost." . . . .

In the Collection Moreau St. Mery, of the French Colonial Archives, there is a memoir of Lavérendrye, addressed to M. De Beauharnois, and dated at Fort St. Charles, in 1737, which seems to cover generally the same ground and the same period of time as the extract from Lavérendrye's journal forwarded to Paris by Beauharnois, under date of the 14th October, 1737, quoted above. At the same

time, the details are in many particulars so widely different, that it is almost impossible to make the two accounts fit into each other. Possibly if we had a full transcript of the Moreau St. Mery manuscript the difficulty might be lessened, but unfortunately a copy of this document has not yet been received in the Canadian Archives (in the original it covers 38 pages of *Ms.*), and all that we have to go on is a synopsis of the document in the Archives Calendar which is given here for purposes of comparison with the preceding document:—

"Memoir of de la Véranderie to M. de Beauharnois,[1] to be sent to the court. Has already sent an account of what occurred from the date of his departure from Montreal, in June, 1735, up to 2nd June, 1736, the date of Sieur Bourassa's departure. Has since continued to keep up his journal with the same exactitude. His two sons arrived that same day from Fort Maurepas, telling him the news of the death of his nephew De la Jemmeraye, which happened on 10th May, at La Fourche des Roseaux, where they erected a cross. Being in want of merchandise and powder, he sent his eldest son with Père Auneau to Kaministiquia to meet the canoes from Michilimakinak. Letter from Bourassa pillaged by the Sioux. 17th June, arrival of Sieur Legras[2] with two canoe loads of goods. 20th June, arrival of 30 Cristinaux with furs, and news of the massacre of 21 men at a point seven leagues from the fort. 29th July, arrival of four Frenchmen. August 4th, arrival of four Crees, promising to help to avenge his son. Departure of his other son for Fort Maurepas, with Indians. September 17th, sent six men to disinter the bodies of Père Anneau and of his own son, which he caused to be buried in his chapel, with the heads of the other Frenchmen. October 15th, arrival of a large number of Indians. Their statements: "There are 800 Indians at la Pointe du Bois fort. They want to avenge his son and the other Frenchmen, and to have his second son for their chief." His answer: Exhorts them not to go to war then. February 8th, 1737, leaves for Fort Maurepas, with his two children, ten Frenchmen and many Indians. February 25th, arrival at Fort Maurepas. Decided to remove Fort Maurepas to the great Forks of Rivière Rouge, where the Assiniboels were awaiting him. Speaks of another great lake to the west, which is called the brother of Lake Ouinipigon, where there is an abundance of game. Sends a map of the country. General description of the country. March 11th, return to Fort St. Charles. June 3rd, departure for Montreal with 14 canoes laden with furs. June 25th, arrival at

[1] Collection Moreau St. Mery, 1732-1740, Vol. 10, F. 12, Fol. 248.

[2] See previous footnote in regard to Sieur Gras. Gras and Legras are evidently the same.

Kaministiquia. July 22nd, arrival at Michilimakinak. August 3rd, departure for Montreal."

In *The Aulneau Collection* are a number of letters bearing upon the Lake of the Woods massacre. They have particular reference to the death of Father Auneau, or Aulneau as it is always here spelled.

The first of these letters is from Father Nicholas de Gonnor [1] to a correspondent in France.[2] After some personal remarks he says:—

"Another reason for writing you is, to beg you to break as gently as possible to Father Aulneau's mother, the news of the death of her dear son, who, we have learnt but lately, was massacred last May by a party of wandering Indians, called the Sioux of the Prairies, while he was journeying from his own to another mission, with the intention of going to confession and of seeking advice on troubles to which his extreme delicacy of conscience had given rise. He is universally regretted by both the members of the Society and by seculars, for he was universally esteemed. . . .

"He was surprised with twenty other Frenchmen, but it is not known how they were put to death. No premonitory sign of distrust on the part of the Indians was noticed, nor were the victims tortured, as they are wont to be when prisoners are taken in battle. It is conjectured that they were surprised while asleep, and received their death blow unawares. The heads of all were then severed from the bodies.

"It is said, however, that from the position in which the Father's body was found, he must have been on his knees when he was decapitated, and one of the party who found him took possession of his *calotte,* remarking that poor as he was, he would not part with it for a thousand crowns." . . . .

In 1739, Father du Jaunay, writing from Michilimakinac to Madame Aulneau, adds the following particulars:—[4]

"Concerning the circumstances accompanying the death of your dear son, here is what I have learnt from hearsay, and some of my sources of information seem trustworthy.

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[1] Father Nicolas de Gonnor, according to a footnote at page 25 of *The Aulneau Collection,* belonged originally to the Province of Aquitaine. He was born November 19, 1691, and entered the Society of Jesus, September 11th, 1710. He came to Canada in 1725. In 1727 he was sent to the Sioux mission, and afterwards he was stationed some time at Sault St. Louis.. In 1749 he had returned to Quebec; thence he was once more sent to the Sioux, where he was superior in 1752. He remained there until 1755, when he was transferred to Montreal, and the following year to Quebec, where he died, December 16, 1759. His Indian name was *Sarenhés.*

[2] *The Aulneau Collection,* pp. 87-89.

[3] The skull-cap sometimes worn by clergy of the Church of Rome.

[4] *Aulneau Collection,* p. 110-111.

"In the first place, the majority of the Indians implicated were averse to putting him to death. In the second place, it was through sheer bravado that a crazy-brained Indian set at naught the consequences which held the others in awe.

"A third particular I have gathered is, that scarcely had the deed been perpetrated, than a deafening clap of thunder struck terror into the whole band. They fled from the spot, believing that Heaven was incensed at what they had done.

"Finally, that the portable chapel and, namely, the chalice, which was plundered, had fallen into the hands of a widowed squaw who had several grown-up sons, the pride and wealth of the tribe. In a remarkably short lapse of time, all, or nearly all of them perished in her sight. This she ascribed to the chalice, which her sons had given her; so she rid herself of it by throwing it into the river.

"This," concludes Father du Jaunay, "is all I have been able to gather from the various accounts of the Indians. I met here with a native, who claimed to be a Sioux and to have been present at the massacre; but on being warned that he was an imposter, I did not think it proper to question him, trusting to time to throw more light on the occurrence."

In the Archives of the Gesù at Rome is preserved the following letter, from Father Lafitau to the Father General at Rome. The letter is dated at Paris, April 4th, 1738, and the original is in Latin:—[1]

"As to what relates to Father Aulneau, nothing more has been learnt than what has already been written. He had followed an officer whom the Governor of New France had commissioned to discover the way across the continent to the Western Ocean, as yet unknown from this side. He had reached the sources of the Mississippi and had penetrated further west. But, according to the custom of adventurers of that class, who are alive to their own interests which they consult rather than the common weal, the party had, in barter, sold powder and other munitions of war to the tribes they met with.

"Some of the Indians, incensed at this species of traffic at which their enemies gained an advantage, took occasion of an expedition this officer had planned and had entrusted to his own son as leader, with Father Aulneau—who had a presentiment of his death, as his letters attest—to accompany him.

"In fact, the savage band stole upon them unawares, and slaughtered them all. Father Aulneau received two thrusts of a knife, and was decapitated."[2]

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[1] *The Aulneau Collection*, pp. 91-92.

[2] Father F. Nau, writing in 1738 to Father Aulneau's mother, said: "A party of Frenchmen had captured, last autumn, the murderer of our dear

About thirty or forty years ago, Father Felix Martin, S.J., sought to glean some additional particulars of the massacre, and the result of his researches is summed up in the following note—found among his papers after his death:—[1]

"We are not in possession of the details relating to Father Aulneau's family, education and vocation to the religious life.

"He came to Canada in 1730, and six years subsequent to his arrival, he was chosen to accompany an important expedition of discovery westward, undertaken by Monsieur de la Véranderie. The latter commanded a party of twenty determined men, one of his own sons being among the number.

"The explorers had reached the Lake of the Woods, and had landed on an island for their morning meal. Their camping fires, however, betrayed their presence to a band of Sioux warriors who were prowling about in the neighbourhood.

"These Indians, notorious for their cruelty and for the implacable war they waged on all those who gave them umbrage, resolved to attack the French. They stealthily landed on the island without attracting notice, and rushed upon the explorers who were off their guard. Many were pierced with arrows or were felled with the tomahawk. Some sought safety in flight, only to perish in the waves. Father Aulneau, wounded by an arrow, fell upon his knees, when an Indian coming up behind him dealt him the death blow with his tomahawk.

"All the baggage was pillaged, but the Indians dared not touch the body of the missionary. Three weeks after the occurrence, a party of Indians of the Sault (*Sauteux*), passing by the spot, found his body unmutilated. Not being able to dig a grave for it, as the island was all rock, they raised over the body a cairn one or two *metres* in height.

"Mr. Belcourt,[2] a missionary stationed at Pembino, in 1843, visited the place and saw the tumulus. He gathered on the very spot the tradition of the massacre from the lips of an Indian, whose father had helped to prepare a sepulchre for the missionary."[3]

Father Aulneau, and intended to bring him to the French settlements to make him undergo the penalties he so well deserved; but God reserved to Himself the punishment of his crime. . . . . Other heathen tribes rescued the Sioux prisoners from the hands of the French and sent them back to their homes."

[1] *The Aulneau Collection*, p. 90.

[2] Rev. G. A. Belcourt was a well-known missionary in the North-west. He was a relative of the present Member of Parliament for Ottawa, of the same name.

[3] I fear we cannot put much credence in this explanation of Father Martin's. From the very beginning he is inaccurate. Father Aulneau did not come to Canada in 1730. He landed on the 12th August, 1734. Father

A translation of Mr. Belcourt's narrative will be found in the Minnesota Historical Collections. It is as follows:—

"A tradition of the savages near the Lake of the Woods reports that the French travellers in passing were invariably accompanied by a missionary; and that one of them was killed on this same lake, and his companions all either killed or drowned. The following is the manner in which they relate this occurrence: Early one morning, a French canoe manned with eight men left a trading house which the French had built about the middle of the Lake of the Woods, and stopped upon an island near to the last pass, to enter the river of Rainy Lake. The atmosphere was so still that the wind could hardly be felt. Having built a fire to take their repast, the smoke rose up and was perceived by a party of Sioux warriors who were approaching the same island by a branch of the river of Rainy Lake called *the Road of War.* These having landed on the opposite side of the isle unperceived by the French, fell upon them unawares and massacred the missionary and some of his companions; the others throwing themselves into the water in order to cross over to some other islands were drowned. This event took place, according to the report of the savages, about the year 1750."[1]

In a long memoir, written at Quebec, and dated 31st October 1744,[2] Lavérendrye once more refers to the Lake of the Woods tragedy, and this is the last bit of evidence which I have been able to gather:—

"I had many people in the fort and no provisions, and this determined me to send at once three canoes to bring us supplies and merchandise. The Reverend Father decided, on the spot, to go to Missilimakinak. He asked for my eldest son, as he hoped that his journey would be quick. It was not possible for me to oppose him. His resolution was absolutely taken. They embarked the 8th June, and were all massacred by the Sioux, seven leagues from the fort, by the

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Martin confuses Vérandrye's general expedition to the west with the particular journey on which the tragedy occurred at the Lake of the Woods. This particular journey was not in any sense exploratory. It was simply an expedition to Kamanistigoüia and Missilimakinac for supplies. It was not commanded by Vérandrye the elder, who did not accompany it at all. The graphic account of the massacre which follows would be extremely valuable and interesting if it were based upon a more substantial foundation. The remaining particulars are more probably correct.

[1] "Department of Hudson's Bay," by Rev. G. A. Belcourt. Minnesota Historical Collections, Vol. II., 1850-1856, p. 212.

[2] "Mémoire du Sieur de la Verendrye au sujet des Etablissements pour parvenir à la découverte de la mer de l'ouest, dont il a été chargé par M. le marquis de Beauharnois, Gouverneur général de la Nouvelle-France en 1731." This document is published in Margry's Collection. It is also in the *Canadian Archives.*

worst of all treacheries. I have lost my son, the Reverend Father, and all my Frenchmen, which I shall lament all my life."

An examination of these various accounts will reveal a considerable diversity of opinion as to the circumstances which led up to and attended the massacre, and the causes which induced the Sioux to attack a party of Frenchmen. Much of this disparity may be attributed to the radically different points of view of those whose evidence has been adduced; some of it is explainable by the fact that the various statements were written at widely different times and places. Making due allowance for these circumstances, and weighing carefully the evidence of the various witnesses, the reader will, I think, find it possible to extract from these various documents a fairly complete and accurate account of this most disastrous incident in the search for the Western Sea—the tragedy of the Lake of the Woods.

III.—*The Hon. Henry Caldwell, L.C., at Quebec, 1759-1810.*

By SIR JAMES M. LEMOINE, D.C.L.

(Read May 19, 1903.)

Capt. Hy. Caldwell serving under Wolfe, at Quebec	1759
Commander of British Militia, at siege blockade	1775
Called to Legislative Council	1782
President Provincial Agricultural Society	1789
Receiver-General for Canada	1794-1810

In June, 1759, there landed in Canada from Admiral Saunders' fleet, a youthful British officer, destined to fill, at Quebec, a long, active and very distinguished career: Capt. Henry Caldwell of Colville's regiment, whose promotion dated from January, 1759.

At the memorable fight of 13th September, 1759, on Abraham's Heights, the youthful captain, aged 24, acted as Assistant-Quartermaster-General to General Wolfe. His bravery brought him a step in rank; he became Major Caldwell, under which title were won his brightest laurels. A portion of the British forces, after the battle of the Plains, were recalled; the 78th Highlanders were disbanded in Canada; the Major cast his lot for Canada and settled at Quebec. Major Caldwell, by his active business habits, seems to have preserved the esteem of General James Murray, who remained in Quebec, as its first English Governor, until 1766.

A few years will elapse, and we will find the Major the trusted agent, and subsequently the lessee of the General's extensive Canadian estates. Major Caldwell continued to fill military duties in the army of occupation until 1773, when Lord Barrington, Secretary of War allowed him to sell out.

In virtue of a notarial deed of lease, bearing date 7th April, 1774, he was named agent and lessee of the great Seigniory of Lauzon, and of numerous other properties acquired by General Murray. The General, like many other distinguished British officers, had been bitten by the earth hunger, so prevalent in the first years of British rule. Many distinguished Frenchmen the owners of large seigniories in Canada, resolved to return to France in 1760, such as those of Longueuil, the Seigniories of Lauzon, Terrebonne, Foucault, la Prairie, la Chenaye, Belœil, etc.

Governor Murray was not by any means the only British officer craving for land; Sir Thomas Mills, Cramahé, Major Samuel Holland, Major Caldwell, Capts. Fraser, Nairne, Laughlin Smith, the Hales and

others, invested large sums in real estate, near Quebec, in the early days of the colony, after the conquest.

The clever Seignior of Lauzon had from the first been deeply impressed with the great possibilities which Canada, despite a severe climate, offered for agricultural, manufacturing and industrial pursuits.

Voltaire's sneer, at the "15,000 acres of snow," if it ever came to the ears of the Major, evidently had no terror for him. Let us proceed.

A crisis in Canadian affairs was imminent in 1775; the colony had to fight for its very existence. Major Caldwell was just the man to come to the front and buckle on his sword; his zeal, devotion, undoubted courage as Commander of the British Militia of Quebec during the fierce assault and blockade by Montgomery and Arnold, are matters of history.

Caldwell had, in no small measure helped Guy Carleton in saving Canada to Britain. Recognition and reward were in store for him; he received and merited both.

General Carleton selected Major Caldwell to be the bearer of the despatches, announcing the defeat of the invaders in 1775-6.

Caldwell warmly recommended by Guy Carleton and Col. Allan McLean, landed in England amidst public rejoicings, on the 15th June, 1776.

Imperial Rome had a laurel crown for the trusty messenger bringing the news of a Roman victory. England, more practical, rewarded Major Caldwell, the bearer of the glorious tidings, with a gift in hard cash of £500 sterling,—the War Office made him a Lieutenant-Colonel, whilst the King, later on, named him a Legislative-Councillor, at Quebec.

It is evident Caldwell's visit to London was far from being barren of results, so far as he was concerned. His merit, intelligence, handsome person and happy address, secured to him some powerful friends, amongst others William Pitt, the son of the great Lord Chatham. The influence thus acquired, helped some ambitious plans he had previously entertained.

He applied to the Lords of Commerce, for a grant of the Quebec and Levi ferry. They wrote on the 8th April, 1777, to Governor Carleton, as to the propriety of granting a privilege, seemingly of considerable magnitude. The ferry service in summer was effected by canoes and "bateaux" who landed passengers and freight in the cul-de-sac (the Champlain market now occupies the site). In winter, access from Levi to the city, was had over the ice-bridge when it formed, and in canoes, when it did not.

Caldwell failed to succeed in this project; it was thought too important a monopoly to be given to one man, over such a large extent of the harbour. Caldwell, a brave, intelligent and ambitious man, elated with past honours conferred, aspired to a high post. He applied for the position of Lt.-Governor, to be vacant by the return of Cramahé to England. General Haldimand, Governor of the colony, on being consulted replied to Lord Germaine, that though he acknowledged the fitness of Caldwell, still he preferred to see Col. Hamilton appointed to the position previously held by Cramahé, which was done.

Col. Henry Caldwell, during his tenure of office as Legislative-Councillor, met with some contradictions and occasionally official reproof; one instance in point: a complaint had been made to the Colonel in 1782, about a captain of militia residing at St. Nicholas. General Haldimand, in a letter on the subject to Caldwell, took the militia-captain's part. Caldwell complained and justly too, of favouritism having been shown to colonists, such as de Rouville and an other; his juniors in rank, being made full colonels over his head.

Later on, Col. Caldwell, smarting under the sense of injustice that his military service was forgotten, resigned his commission as Lt.-Colonel—but his permanent appointment as Receiver-General, in 1794—allayed his irritation, one is led to believe.

Caldwell was the friend of progress; had introduced the latest machinery in his large grist-mills and saw-mills—and various improvements on the numerous farms he had acquired in the country,—in the system of tilling and fertilizing the soil, and improving the breed of cattle and farm stock generally.

In the year 1789, he became president of the first Society of Agriculture organized in Canada. On the 6th April of that year, the rank, fashion, nobility and clergy of all denominations, as well as commoners, crowded the halls of the Chateau St. Louis, at the beck of Lord Dorchester to enter their names as subscribers to the Quebec Agricultural Society. The Governor-General, Lord Dorchester was named patron; Hon. Henry Caldwell, president, and the Hon. Hugh Finlay, Deputy Postmaster-General, secretary.

SUBSCRIBERS.

The Roman Catholic Bishop of Quebec.
Chief Justice Wm. Smith.
Rev. Philip Toosey, Military Chaplain.
T. Monk, Attorney-General.
John Blackwood.
Matthew Lymburner.
A. de Gaspé.
Obediah Aylwin.
Major R. Matthews.
Capt. Rotson.
Capt. Fraser.
Kenelm Chandler.
Peter Stewart.
Malcolm Fraser.
Hon. Hugh Finlay.
" Thos. Dunn.

Bishop Bailly, coadjutor.
Jenkins Williams.
Juchereau Duchesnay.
Dr. Mervin Nooth.
Isaac Ogden, judge of Admiralty.
Sir Thomas Mills.
J. Arthur Coffin.
G. Taschereau.
Perreault, l'Aîné.
L. de Salaberry.
Capt. St. Ours.
Rev. A. Hubert, curé de Québec.
J. T. Cugnet.
Messire Pauet, curé de la Rivière Ouelle.
Hon. Edward Harrison.
" John Collins.
" Adam Mabane.
" J. C. de Lery.
" G. W. Pownall.
" Henry Caldwell.
" Wm. Grant.
" François Baby.
" Samuel Holland.
" George Davidson.
" Chs. de Lanaudière.
" Lecompte Duprès.

Hon. Mr. Caldwell, on being elected president, addressed the meeting in eloquent terms, both in English and in French; twelve members were chosen as directors. The president dwelt forcibly on the modes of improving agriculture—the sowing of hemp to compete with foreign importation—amelioration of farm stock—planting of fruit trees—experiments in seed wheat—offering prizes and entering the lists himself as competitor; such were the doings of the enterprising "Lauzon Farmer," backed by His Excellency, Lord Dorchester.

One of the most important offices which had to be created in the colony after the conquest, was that of Receiver-General of the public dues, and of accounting for the same.

The first incumbent was Thomas Murray. In those days the Receiver-General was not compelled to reside in the province. Absenteeism of high officials was in vogue. Sir Thomas Mills, recently landed from England, succeeded Thomas Murray, on 10th July, 1765.

After a short residence here, he returned to London, leaving as his deputy a Mr. William Grant. The salary was insignificant, $800—later on, increased to $1,600; a remuneration totally inadequate for the responsibilities and duties attached to this high office; the titular having to keep up with the expenditure attending the high official circles of society, in which he was expected to move. It was, however, said that the large sums of money passing through the hands of the incumbent—the absence of provincial control over his acts—possibly some additional fees of office, would afford the officer facilities to make the most of his position, by way of compensation for low salary. William Grant soon gave cause for complaint; he refused to account for "receipt and expenditure" to the Governor of the colony, alleging that he was accountable to the imperial authorities only. General Haldimand appointed Col. Henry Caldwell, to take *pro-tempore*

Grant's place in 1784, until the home authorities should be consulted.—ordering Thos. Ainslie, collector of customs, at Quebec; Geo. Pownall, clerk of the court, and other public servants, to pay over to Caldwell only, the public moneys received by virtue of their respective office. The Colonel's permanent appointment was gazetted in 1794.

On the 28th February, 1801, Col. Caldwell purchased from General James Murray, by the agency of Lt.-Col. Robert Matthews in London, not only the lordly domain of Lauzon (which included the old parishes of Point Levy, St. Charles, St. Henri, part of St. Gervais, St. Nicholas), but also the seigniories of Rivière du Loup, Madawaska, Foucault, on Lake Champlain, Sans Bruit estate with Belmont manor, near Quebec, together with the fief of St. Foy and a house in St. John Street, Quebec.

Price of sale, £10,180 sterling, payable in instalments.

When taken in connection with other real estate purchased, Col. Caldwell then ranked with the greatest land owners in the province. His speculations in land were not always satisfactory. In 1788, he had applied, but in vain, to Lord Grenville to be compensated by the Crown for the loss of 20,000 acres of land which the verification of the boundary between Canada and the United States had lopped off, the 35,000 acres which hitherto had composed his seigniory of Foucault (Caldwell manor) on Lake Champlain; he petitioned, in conjunction with others, for Crown Lands from the British Government and was informed that each petitioner ought to make a separate request; thus were rewarded his military services!

* * * * * *

The Hon. Henry Caldwell in the enjoyment of the perquisites of his exalted post of Receiver-General was drawn deeper and deeper into land speculations and industrial schemes. The seigniory of Lauzon soon could boast of a splendid grist mill and saw-mills at St. Nicholas, Levi, Etchemin. Roads were opened — bridges built — colonization promoted.

Belmont Manor,[1] near Quebec — his elegant home — the seat of generous hospitality, burnt in 1798, had been improved and rebuilt. Here continued to reside, courted and esteemed, the hero of the two sieges, 1759 and 1775. Col. Caldwell, according to tradition, seems to have also been favoured with a handsome person. I well remember being told by the late Hon. William Sheppard, of Woodfield, near Quebec, that *le beau militaire* was supposed to have been the hero in Mrs.

[1] *Proprietors: Intendant Talon, 1670; Gen. James Murray, 1765; Hon. Henry Caldwell, 1801; Sir John Caldwell, 1810; John W. Dunscomb, 1854.*

Frances Brook's novel, "*The History of Emily Montague,*" and was meant for Col. Rivers, the friend of the divine Emily. This was the first English novel written in Canada, in 1767.

A great sorrow invaded, in 1804, the sweet retreat of Belmont Manor; the death, on the 19th February, at the age of 67 years, of the loved *chatelaine,* Ann Caldwell. This much esteemed lady was sister to the Lord Bishop of Ossory, and of Baron Hamilton; she left an only son, John Caldwell. The learned Rev. Alexander Sparkes, who had landed at Quebec, in 1780, had been selected as the preceptor to the only son of Col. Caldwell; he found a bright and apt scholar in young John, who, after going through a course in the classics and in foreign languages, studied for, and was admitted in 1789, a member of the Quebec Bar; he also received a commission in the Canadian militia.

Young John soon became his father's factotum in the management of the seigniory of Lauzon, and other family estates in Canada. His sympathetic and kind treatment of his father's tenantry, as well as his liberal views won him their confidence. In 1804, and again, in 1809, he was deputed to parliament as member for the extensive county of Dorchester, which then comprised Lauzon, Ste. Marie and other large centres in the Beauce district.

In 1812 John Caldwell, who was to become Sir John Caldwell by the death of an Irish baronet, succeeded to his father's office as Receiver-General, accepting the onerous charge and its responsibilities, Col. the Hon. Henry Caldwell, expired at Belmont Manor, on the 28th May, 1810, aged 75 years. His remains were buried in the vaults of the Anglican Cathedral.

Mr. Jos. Edmond Roy, the historiographer of the Seigniory of Lauzon, published the olograph will of the Receiver-General, its tenth Seignior.

Among other provisions in this lengthy document there are several legacies; to his wife, Mrs. Caldwell; to his brother, Major-General Caldwell, serving in Portugal an annuity of £200; to the children of his younger brother Charles, a naval officer, who died in 1775; there are also legacies to Edward Bowen, attorney-general, later on, chief-justice, who died at Quebec, in 1865; to Miss Margaret Coffin, Mrs. Alice Simpson, Miss Annabella Simpson, Miss Sarah Taylor, Miss Christian Nairn, Dr. James Davidson, William Hamilton, without forgetting the poor, whom he was in the habit of assisting each week in winter; to each the generous old man left 40 shillings.

The warrior who, on so many occasions, had braved shot and shell, seems to have had a holy horror of being buried alive, judging from the text of his will, which I shall give, in Mr. Roy's French ver-

sion: "C'est, de plus, ma volonté, si ma mort arrive en été, que mon corps demeure dans mon lit jusqu'à ce que l'on ne puisse plus longtemps supporter l'odeur. Si la mort a lieu en hiver, je désire que mon corps demeure pareillement dans mon lit cinq à six jours et que l'on fasse du feu dans la chambre, à moins que l'odeur ne puisse plus être supportée. C'est ma volonté que mon corps soit alors confié à la terre dans la voûte que j'ai fait construire dans le cimetière, à Québec."

Belmont lines the St. Foy heights in a most picturesque situation. The view from the east and northwest windows is magnificently grand; probably one might count more than a dozen church spires glittering in the distance—in every happy village, which dots the base of the blue mountains to the north. In 1854, this splendid property was purchased by J. W. Dunscomb, collector of customs, Quebec; he resided there and, about 1864, he sold the mansion and garden to the Roman Catholic church authorities of Quebec, reserving 400 acres. The old house, a few months later, was purchased by Mr. Wakeham.

The first time our eyes scanned the silent and deserted banqueting halls of Belmont, with their lofty ceilings and recalling the traditional accounts of the hospitable gentlemen, whose joviality had once lit up the scene, visions of social Ireland of Barrington's day floated uppermost in our mind. We could fancy we saw the gay roysterers of times bygone; first, a *fête champêtre* of lively French officers from Quebec, making merry over their Bordeaux or Burgundy, and celebrating the news of their recent victories over the English at Fontenoy, Lauffeld or Carillon to the jocund sound of *Vive la France! Vive le Maréchal Saxe! à la Claire Fontaine!* etc., then, Governor Murray surrounded by his veterans, Guy Carleton, Col. Caldwell, Majors Hale and Holland, and some of the new subjects, such as brave Chs. de Lanaudière,[1] complimenting one another all round over the feats of the respective armies at the two memorable battles of the Plains, and all joining loyally in repeating the favourite toast in Wolfe's army *British colours on every French fort, port and garrison in America.*[2]

Later on, at the dawn of the late century, a gathering of those Canadian barons, so well delineated by J. Lambert in his *Travels in Canada in 1808*, one week surrounding the board of this jolly Receiver-

[1] Chs. Tarieu de Lanaudière, Knight of St. Louis, commanded a portion of the Canadian militia at Carillon, was A.D.C. to Sir Guy Carleton—served in 1775—accompanied the General to England, where George III. rewarded him; he was made Legislative Councillor and Deputy Postmaster General for Canada.

[2] The sanguinary battle of Fontenoy, was fought on the 11th May, 1745. The battle of Lauffeld took place on the 2nd of July, 1747. The French victory at Carillon, in which the militia of Canada bore a conspicuous part was won near Lake George, 8th July, 1758.

General of Canada at Belmont Manor; the next, at Charlesbourg, making the romantic echoes of Chateau-Bigot ring again with old English cheer and loyal toasts to "George the King"! or else installing a "Baron" at the Union Hotel, *Place d'Armes,*—and flinging down to the landlord, as Lambert says "250 guineas for the entertainment." Ah! where are now the choice spirits of that comparatively modern day, the rank and fashion, who used to go and sip claret or ice cream with Sir James Craig at Powell Place (Spencer Wood). Where gone the Muirs, Paynters, Munros, Mathew Bells, de Lanaudières, Lymburners, Smiths, Finlays, Caldwells, Percevals, Jonathan Sewells, Uniackes. Alas! like the glories of Belmont, departed—living in the chambers of memory only.

This estate, which until lately, consisted of two hundred and fifty acres, was conceded, in 1649, by the Jesuit Fathers to M. Godfroy; it extended from the line of the *Grande Allée* to the Bijou wood. In 1670, it passed over to the famous Intendant Talon. Shortly after the conquest it was occupied by Chief Justice Gregory. In 1765, it was sold for £500 by David Ames of Montreal to General James Murray.

We find that one of the first operations of General Montgomery, in 1775, was to take forcible possession of "General Murray's house on St. Foy road;" later on, the property came into the possession of Col. Caldwell.

In the memory of Quebecers, Belmont manor must remain more particularly connected with the Caldwell family—three generations of which occupied its spacious halls, and where the Colonel expired, in 1810.

Belmont manor is situated on the St. Foy road, on its north side, at the end of a long avenue of majestic trees, distant three miles from Quebec. The original mansion which was burnt down in 1798, was rebuilt by the Colonel, in 1800, on plans furnished by an engineer officer of the name of Brabazon. Col. Caldwell's gracious hospitality drew round his board some of the best known men in Quebec of the time, such as the gallant General Brock, John Coltman, William Coltman, the Hales, Foy, Haldimand, Dr. Beeby, of Powell Place, J. Lester, John Blackwood.

In 1810, Col. Caldwell's son John, accepted the succession, with its liabilities, then unknown—occupied, in summer, a handsome residence in the Seigniory of Lauzon, and was appointed Receiver-General to succeed his father in 1812.

In 1817, Belmont was sold to the Hon. J. Irvine, M.P.P. In 1833, the property reverted to Sir Henry Caldwell, son of (Sir) John Caldwell—Sir John continued to live at the magnificent summer residence

he had built near the Etchemin river at Lévi,—too lavish in his expenditure and unlucky in many of his innumerable milling operations, with heavy liabilities unprovided for. Sir John, on his dismissal from office in 1832 owed the Crown $100,000; this amount was subsequently repaid in full out of the revenues of the seigniory of Lauzon and other estates taken possession of by Government. He died at Bangor, U.S., in 1845.

Works Consulted.

The Titles and Plans of Belmont Estate were submitted to me by J. W. Dunscomb, Collector of Customs, Quebec, proprietor in 1865.

"Maple Leaves" for 1865; "Picturesque Quebec," 1882.

Neilson's old Quebec Gazette, 1764-1810.

Histoire de la Seigneurie de Lauzon, par Jos. Edmond Roy, M.S.R.C. As agent for this vast seigniory, he is in possession of its Titles and Papers.

I seize on this opportunity, to acknowledge my great indebtedness to Mr. Roy's elaborate work for dates and details.

IV.—*The Death of Dulhut.*

By WILLIAM MCLENNAN.

(Read May 19, 1903.)

The Anglo-Saxon constantly asserts with much self-satisfaction that France is no colonizer and points his moral as he unfolds his tale of the fall of French Canada, or French India, with a description of the corruption of the home government, the vileness of the colonial officials and the failure of the King to send help in the hour of need. The inference of course is that England succoured her colonies—and hence the difference.

The true reason of her failure was that France busied herself altogether too much over her distant settlements. She not only attempted to order every detail of their internal government but even their policy towards their neighbours. She provided India, Canada and Louisiana with priests, soldiers and settlers. The officer who had gained his pension and retirement was offered a seigneury with many dignities, the soldier found no difficulty in taking up a respectable farm from his old commander at a ground rent of a few sous for each acre. The King provided the start in life, even up to the important part of a wife with a modest dowry of provisions, clothes and a few livres in good white money.

Every officer who settled in Canada must needs have a title or at least his "lettres de noblesse" and these were bestowed with a generosity which went far to make up the long despaired of arrears of pay.

The home government curbed the governor, the intendant, the bishop, and invited all the tittle-tattle they could write of each other. Without a permission (congé) you could not return to France, you could not go into the English colonies to the south, least of all could you go into the woods and you could not even change your place of residence, say from Montreal to Quebec. Were you a soldier you could not marry without due submission to and permission from your colonel. Were you a tavern-keeper you must have your pewter-pots regularly stamped, must not open before a certain hour or close your door before another. If a "bon bourgeois" you had many duties from that of keeping your ways clean of weeds and briars before your gates to that of being in your own pew in the parish church, upholding your share of the many charities of the town and of taking your place in any expedition which might be put a-foot under proper authority against those cruel devils.

the Iroquois, or against "our natural enemies those ambitious English of New York."

Never was more anxious care and supervision expended over an only child!

For her part England allowed her infants to grow up without overmuch supervision. Royal governors were sent out, more or less adequately supplied with means to carry out the system of the moment. But the mother country gave to her children no practical help or support. Her bantlings paddled about in water, hot or cold as they found it, and though in America they finally broke away from the maternal swaddling-bands yet they developed into a continent of English-speaking, English-thinking folk.

France was too anxious, too "motherly" to allow her children to walk alone, and as a result her name has disappeared from the map of North America; the one survival of her dream of empire remains only in the vague tradition of a peasantry bound in honourable loyalty to her old enemy.

France had great dreams for America, for "New France." The spirit of adventure and conquest was a birthright common to all her sons. She sought again a "Nouvelle France" in the New World as she had in her struggle against the Eastern Empire in the Old.

Think of her pretensions! She had Canada and the St. Lawrence. She had Louisiana and the Mississippi. England had a narrow strip down the Atlantic coast between French Canada on the north and Spanish Florida on the south; the Alleghanies served as a western boundary which her colonists never reached during the first century of their occupation, and to the east was the sea, a barrier and yet a tie to "Home."

Quebec in Frontenac's day held about 1,345 souls, Three Rivers 150, and Montreal 1,418. Westward from Montreal there were Forts Frontenac, Niagara and Detroit, besides some less important ones towards the north.

From Detroit down to the present New Orleans there were certainly not more than one hundred and fifty Frenchmen to hold this "New France" for His Most Christian Majesty. This force was distributed in about ten forts, or, more properly speaking stockaded posts, scattered along at various points between Detroit and the mouth of the Mississippi. The garrison of each, if complete, would consist of the commandant, his lieutenant, a storekeeper, a sergeant and ten soldiers—say from twelve to fifteen men in each.

On its face the situation seems absurd, but Frontenac never dreamed of holding the country by means of the scanty help sent by the

home government. His hundred and fifty men were simply so many representatives of the pomp and power of Old France, his reliance was on the friendly Indian tribes who occupied this long stretch of border territory.

Their allegiance was obtained partly by judicious attention and deference and partly by boldness through the medium of that large class of wandering Frenchmen who were explorers, fur-traders and even coureurs-de-bois. In the first class we find such men as LaSalle, Dulhut, Péré, Perrot, Nicolet, Jolliet and others, all of whom were fur-traders (but, *nota bene*, licensed fur-traders, holders of *congés*, that is, permits to trade.) These men had an intimate knowledge of the savage and many of them had remarkable influence over the wildest tribes; it was to their personal influence that France secured and held effective allies along her ever-spreading borders. They conciliated the tribes, acted as intermediaries between them and the governor, and, by just treatment and marvellous courage bound the Indian so firmly to France that she long held the West free from all intrusion.

With the exception of the conspiracy of Pontiac, Canada has been spared the horrors and miseries of Indian warfare since the conquest. The wandering fur-trader and later the lonely settler in our Northwest lived out their lives amid native and exiled tribes without danger or even alarm, and this because England was wise enough, in Canada at least, to accept and follow up the conciliatory policy towards the Indian which France had so happily inaugurated.

Apart from the explorers and licensed fur-traders, who were few in number, there was a surprisingly large body of men who had taken to the woods; some legitimately enough as voyageurs or employés, others simply for the love of the free, vagabond life, that curious desire of the return towards the savage. These were known as coureurs-de-bois; and, although a constant anxiety, they were at times an effective aid in the many expeditions set on foot by the ever-active government at Quebec.

Whether it was an expedition towards the West to overawe or combat unfriendly tribes, a raid to the North to surprise the English on the shores of Hudson's Bay or a sea-flight with d'Iberville to Newfoundland, Maine or Louisiana, the coureur-de-bois was ever ready to share in the adventure. Many of them lived the lives of outlaws with a price upon their heads and too many were merely wandering vagabonds, far below the Indian in every decency of life and honour.

Coureur-de-bois was as bad a name as a man could well be called in Canada two hundred and fifty years ago, and this was the stigma which Duchesneau, the intendant, tried to fasten upon Daniel de Greysolon, Sieur Dulhut, a man of the highest honour and unblemished life.

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Ten years ago I published in Harper's Magazine (Sept. 1893) what I then knew of this gentleman-adventurer, explorer and fur-trader.

He had Italian as well as French blood in his veins, and was born at St. Germain-en-Laye about the middle of the seventeenth century. He was ensign in La Compagnie Lyonnaise in 1657, and in 1664 was a gendarme de la Garde du Roy, the King's Body Guard, which fixes his gentility beyond question, for one of the qualifications was the proof of the right to bear arms for two hundred years (deux cents ans de noblesse).

There can be as little doubt as to his title of explorer. M. Henri Lorin in his admirable study on Frontenac says that Dulhut "is a discoverer of the same title as LaSalle." As to fur-trader, every one in Canada from the governor downwards, men, women, clergy and laity were, or wished to be engaged in this extremely lucrative traffic.

When he came out to Canada I do not know, but he was in Montreal before 1674. That year he sailed for France and was in time to play his part as squire to the Marquis de Lassay through that awful August day at Seneff on the borders of Brabant. Seneff is a name which arouses no remembrance in English breasts to-day; but it was so close an affair between Condé and our Prince of Orange that it was doubtful with whom the advantage lay until Condé followed William and forced him to raise the siege of Oudenarde. The Hollanders and Spanish numbered 90,000 and the French less, each side lost between seven and eight thousand men. Condé had three horses killed under him and as the young Marquis de Lassay had two horses killed and was thrice wounded, his squire, our M. Dulhut, must have seen very active service on that now almost forgotten day.

It is a curious coincidence that the Recollet father, le révérend père Louis Hennepin, was at Seneff that day looking after the wounded, shriving the dying. It is improbable there was any meeting then, but years afterwards Dulhut and Hennepin met on the upper waters of the Mississippi, when the priest was in even greater danger than on the field of Seneff.

Dulhut must have returned to Canada by the last vessels of that year and when we next hear of him he and his younger brother Claude Greysolon de la Tourette had leased a modest property from Pierre Pigeon on the south-east corner of Notre-Dame and St. Sulpice (then St. Joseph) streets.

The brothers had both friends and relations in Canada; their uncle Jacques Patron had apparently been in Canada since 1659; their brother-in-law, Louis Tayeon, Sieur de Lussigny, was an officer in Frontenac's guard; Alphonse and his more famous brother Henri de Tonti,

the friend of LaSalle, were their cousins, and so apparently was Delietto. The Tonti were sons of Lorenzo Tonti, the Neapolitan banker, who, when a refugee in France founded the system of what we now know as Tontine Insurance. Delietto was an officer in the French army.

At that time there was no indication that Dulhut would become a wanderer. He had ample means, and, tired of lodgings, built for himself a handsome house with grounds running down to the river. The house stood on the northern side of the street across the foot of the present Jacques-Cartier Square, the gardens were behind and the lot between the street and the river was afterwards purchased to secure the view. Here he settled with his brother La Tourette and their fat and choleric friend Jacques Bizard, formerly captain of Frontenac's guard, now town-major. It certainly was a handsome establishment for a young man, probably the best in Montreal at that day and yet ere a year had gone Dulhut sold the place to his uncle, Jacques Patron, and started for the West, "le pays d'en-haut." This was on the 1st September, 1678, and he had with him, his brother La Tourette, six Frenchmen and three slaves, probably Panis, presented to him by friendly Indians, to serve as guides.

That he had great personal courage perhaps counted but for little in a day when most men had to be brave. But Dulhut's courage was not that of mere personal braving of danger, though no doubt he faced that often enough; it was the greater courage for duty's sake. When in command at one of his forts on Lake Superior in 1684, he actually pursued, captured, tried and convicted the Indian murderers of two Frenchmen, and despite all the threats, lies and cajoleries of a powerful and hostile tribe of Indians, at the imminent risk of his life and at the risk of the life of every Frenchman in the Northwest, but simply because he believed it his duty, replied to all the entreaties of the chiefs that had the culprits been prisoners of war he would gladly have released them but as murderers they must die. "It was a hard stroke for them," he says, "none of them believed I would undertake it."

There was not another post within possible reach, but he held that the safety of every white man west of Fort Frontenac lay in his hand and though he had not more than forty-two followers in all, probably not more than half of whom were white, he marched his little force out of his fort to within two hundred paces of the Indian encampment, and there in the face of over four hundred sore and truculent savages he carried out the sentence to which their own chiefs had agreed.

Thereafter there was no question of Dulhut's word in the Northwest. The Indians both feared and trusted him, his friends loved him, he was generous in thought and act and no one speaks of him dispa-

ragingly save the Intendant Duchesneau and LaSalle. But the intendant was a poor creature by nature and his position as an opponent to and spy upon the governor, no doubt, must answer for many of his faults. As for LaSalle he was a silent, forbidding man, struggling against a load of debt and the constant dread of a withdrawal of court favour. Every man in the West who had any standing, with perhaps the exception of Henri de Tonti, he looked upon with suspicion as a possible intruder on his field. He would neither consult, advise nor co-operate and he went his lonely way until the horrible tragedy on the borders of Mexico ended his unhappy life.

With these two exceptions every one speaks well of Dulhut: it is technically true that Frontenac imprisoned him, but when one reads that though he kept him within the bounds of the Château St. Louis he had a seat and cover for him each day at his own table; it is easy to see that it was only a device to keep him out of the clutches of Duchesneau, the intendant.

He built the first post at Detroit, another at Kaministiquia (the present Fort William) on Lake Superior, another, Fort La Tourette on Lake Nepigon and for nearly thirty years from 1678 to 1707 he was exploring, trading and giving his best services to the Government to hold the Indians not only in check but to keep them loyal to France. He was the first to strike a blow after the awful massacre of Lachine by the Iroquois in 1689; a massacre believed to have been instigated by the English and which ushered in that long series of murderous raids which drew a line of blood from the banks of the Mohawk to the shores of Maine and was the beginning not of a seven but a seventy years' war which lasted until the capitulation of Montreal in 1760.

Dulhut was the earliest explorer of the Northwest; he knew every stretch and bay of Lake Superior and much of the country to the North, he saw the upper waters of the Mississippi long before LeSueur made his famous journey from its mouth, he knew of the Great Salt Lake and only abandoned the journey there in order to save the Père Hennepin, who repaid him with grudging thanks and not a few lies. He held the wild tribes in effective subjection and more than once led them as allies to the French. For this at the end of twenty years he received promotion, a captaincy in the colony troops which meant pay of about 1,000 to 1,200 livres a year. He was heavily in debt and when his old uncle, Jacques Patron, died in 1691, he bequeathed all his property to La Tourette. Worse than this, he had been a lifelong martyr to gout; that he should have kept at his post so long under this most exquisite of tortures speaks volumes for his endurance.

In 1695, through the intercession of the Iroquoise, Catherine Tegahkouita, he was relieved of his sufferings for a term of fifteen months after twenty-five years of martyrdom with attacks that sometimes lasted for three months without relief. In 1696 all are reported well at Fort Frontenac with the exception of Dulhut "who is suffering from his gout."

The latest trace I could find of Dulhut when I wrote my first article was in 1707, when Tonti relieved him at Detroit, and then the brief mention of his death in Vaudreuil's letter of 1710, stating that he had died during the previous winter.

I then accepted the general opinion that he had died somewhere in the West but last year a happy chance gave me the trace of his will and then I found that during the afternoon of the fourth day of March, 1709, Maître Michel LePailleur, Royal Notary for the Island of Montreal, with his two witnesses went to the house of Charles Delaunay, master tanner, where in a lower room giving on St. Paul Street they found "Daniel de Greysolon, escuyer, Sieur Dulhut, capitaine d'une compagnie des troupes du détachement de la Marine" seated in his armchair much troubled by his gout, who, considering "there is nothing more certain than death or more uncertain than the hour thereof," requested Maître LePailleur to make his will.

He commends his soul to God, to the Virgin, to St. Michael the Archangel and to all other Saints of Paradise. He wishes to be buried in the church of the Recollets (which stood until 1866, at the corner of Notre Dame and St. Helen Streets). He makes legacies in favour of the Recollets, the Sulpitians and the Jesuits. He leaves five hundred livres (equal to as many dollars of to-day) to Charles, the five-year old son of his landlord, as well as all his furniture and personal effects, and the residue of his estate he bequeathes to his heirs-at-law in such proportions as his brother La Tourette may decide.

He lived through that year, but when Maître LePailleur came again on the 12th February, 1710, accompanied by M. de la Chassaigne, formerly governor of Three Rivers, Charles Le Moyne, Baron de Longueuil, Antoine Forestier, surgeon, and St. Olive, apothecary, they found poor M. Dulhut no longer able to sit up and very ill indeed. He then altered his will. He bequeathed three hundred livres over and above any wages which may be due at the time of his death to his valet La Roche "for the great care and trouble he has had of him during his long illness." He leaves to Mme deLaunay and to her children all debts due to him especially those due by her husband, and, repeating "Have pity upon me, O God, according to Thy great mercy" he signed before the notary and witnesses.

He died during the night of the 25th-26th February, 1710. In the morning at eight o'clock, the Baron de Longueuil with Lienard de Beaujeu and the Sieur de Blain come and seal up all papers, etc., and on the day following they again appear with Maître LePailleur and make a detailed inventory of all his effects; of which the most interesting items are his diaries for 1676-1677-1678, and some others undated. None of these are known to-day and unless they were sent to his brother La Tourette, who had returned to Lyons, it is most unlikely that they will ever come to light.

Slight as this find may seem it gives us some valuable details of the personality of Dulhut. He held the lease of the ground floor of the house of Charles Delaunay, which stood on the lot now occupied by No. 60 St. Paul Street, he had his valet, his silver forks and spoons, his cane with its silver pommel and chain, his big atlas and a "History of the Jews" in five volumes, probably Josephus, his silk stockings, his cravates and cuffs of fine muslin, three perukes, his scarlet cloak and his good brown suit, gold-laced and with its buttons and button-holes embroidered in gold, but everything much used as became a man who no longer moved abroad, whose days were passed at a window in summer and by the fire in winter.

From his back windows he could look out on the broad St. Lawrence, that highway which had led him so many a weary league into the wilderness; from the front he could catch a glimpse of the house and garden he had built and planted over forty years before and from which he had gone forth for some reason we cannot now discover. When he built it he was a man of about twenty-five ; he stood well with many powerful personages in France; in Canada he was an intimate friend of Frontenac, he was well-to-do, perhaps wealthy; there is no hint of scandal or suggestion of any motive for his sudden departure. Surely there was some heart-break at the bottom of the whole story.

His life from the day he left Montreal was of necessity one of hardship and loneliness. He was often for years together in the depth of the woods, "aux profondeurs des bois" as it was expressively described in his day.

When he returned to Montreal, a man drawing towards the allotment of three score and ten, for such rest and comfort as were possible, he had not a relative near him. His brother, La Tourette, had returned to France and was living in Lyons, so probably had his brother-in-law Lussigny and his cousin Delietto; his uncle, Patron, was dead, as was his cousin Henri de Tonti, and Alphonse was stationed at Detroit.

Apart from the dry bones of notarial documents and occasional and generally hostile mention in the reports of the intendant,

we have nothing from the hand of Dulhut save his memorial to the minister in 1697, and this will and its codicils; but even with this scanty material we can add to Vaudreuil's curt eulogy "he was a very honest man," that he was a man of good judgment, of firm resolution, of strong faith and friendship, singularly modest in a day when self-assertion seemed a necessity for recognition; a man who under constant disappointment and great physical suffering was supported by a marvellous patience that endured until the hour of his release.

V.—*The Gaelic Folk-Songs of Canada.*

By ALEXANDER FRASER, Toronto, Ont.

(Communicated by W. W. Campbell and read May 20, 1903.)

"Cànain àigh nam buadhan oirdheare,
A b' fharsuing cliù air feadh na h-Eôrpa;
Bithidh i fathast mar a thoisich,
Os ceann gach cainnt 'na h-iuchair eôlais."

TRANSLATED:—

"Strange mystic powers lie in that tongue,
Whose praise through Europe wide has rung;
As 'twas of yore in school and college,
It shall be first—the key of knowledge."

Two explanatory words may be allowed.

1. By Gaelic is meant only that branch of the Keltic language whose home and chief habitat are the Highlands of Scotland.

2. The field. It has been estimated that there is about a quarter of a million people in Canada who understand and speak the Gaelic language.

No people are more devoted to their native language than the Scottish Kelts. They have cherished it and retained it through centuries of struggle and vicissitude, as a precious heritage, and in the freer atmosphere of to-day, the old vernacular holds its own against the encroachments of the language of commerce with equal success as in the olden time it did against the prejudices of alien educators and hostile lawgivers. It has come down from sire to son on the plains of Canada with almost equal purity as in the glens and straths of Caledonia.

"'Si labhair Padric 'n innise Fail na Riogh,
'S an faighe caomh sin Colum nàomtha 'n I."

TRANSLATED:—

"'Twas it that Patrick spoke in Inis-Fayle,
And saintly Calum in Iona's Isle."

The printed literature of the Scottish Gael is not extensive, but a Gaelic literature there is, which will compare favourably with the literature of many other countries, and, if taken with that of its kindred branches, is of very respectable proportions indeed. Probably four-fifths of it is poetry. The Kelts are a poetical people; the clansman lived in an atmosphere of poetry and romance; every village had its bard, every family its ready singer. The very vicissitudes of the people

bred idealism and poetic fancy, and their mental pabulum was the song of the minstrel and story of the seanachie. The scarcity, or entire absence of books had the effect of quickening and strengthening the memory, and the ordinary peasant could generally repeat a marvellous quantity of verse. Thus, folk songs passed from generation to generation, becoming sacred in the process, through tender associations dear to the heart of the emotional Gael. The epochs of song correspond to the great national movements which affected the condition or stirred the emotions of the people as a whole. Thus, the Jacobite risings of 1715 and 1745 A.D., were followed by revivals of Gaelic song, the latter date, inaugurating what has been termed the Augustan age of Highland poetry, with its great names—Macdonald, MacIntyre, Buchanan, Mackay and Ross. Following the Jacobite defeat at Culloden came a period of unrest and change in the Highlands from which relief was sought in the new homes of America. Wave upon wave of emigration succeeded, until the landowners and government became alarmed and enacted measures prohibiting the people to leave their native country. These measures, however, were relaxed and the mountaineers, by tens of thousands sought homes in Canada and in the United States. This was at a time when Gaelic poetry was at its best, and when the vanishing echoes of the Jacobite muse were re-awakened by the social upheaval caused by the depopulating of the glens.

The clansmen carried with them not only the treasured songs of the past, but the warm verses wrung from the local bards by the sad scenes incident to the departure of whole country-sides of the native people, leaving nothing but desolation behind them; and the songs, also, which many of those departing composed as "Farewells" to their native land. These songs abound. Many of them are of poetic merit, and are sung in Canada even at the present day. Two of the most popular tunes played on shore as the emigrant ships weighed anchor were "MacCrimmon's Lament" and "Lochaber No More." The first is one of the most pathetic in Highland minstrelsy and its effect to-day is as great on a Gaelic-speaking Highlander as in the emigration days. MacCrimmon, was one of a famous family of pipers, which for generations were retained by the chief of the Clan MacLeod, at Dunvegan Castle, Isle of Skye. They are supposed to have been originally from Cremona, Italy. The family held land from MacLeod, the son succeeding the father in possession and in the office of piper. The name of their farm was Boreraig, and here a piper's college was conducted to which the noblemen and gentlemen of the north of Scotland sent their young pipers to be instructed in bagpipe music, the ordinary term of apprenticeship being seven years. In 1745, MacLeod, of Dunvegan, espoused the side of the house of Hanover, in the Stuart rising. Mac-

Crimmon, the hereditary piper, seems to have had a premonition that he should fall in the war, and accompanied his chief reluctantly. On the eve of his departure he is said to have composed the piobaireachd known as "MacCrimmon's Lament," and the Gaelic words which have been paraphrased by Sir Walter Scott, viz:—

CUMHA MHIC-CRIOMTHAIN.

Bratach bhuadhail Mhic-Leoid o'n tùr mhôr a' lasadh,
'S luchd iomradh nan ràmh greasadh bhàrc thar a ghlas-chuan;
Bogha, sgiath, 's claidheamh môr, 's tuagh gu leôn, airm nam fleasgach,
'S Mac-Criomthain cluich cuairt, "Soraidh bhuan do Dhun Bheagain."

Slan leis gach creig àrd ris 'bheil gairich ard-thonnan,
Slan leis gach gleann fàs 's dean cràc-dhaimh an langan;
Eilean Sgiathanaich aigh! slan le d'bheanntaibh 's guirm' firich,
Tillidh, dh' fheutadh, MacLeoid, ach cha bheô do Mhac-Criomthain.

Soraidh bhuan do'n gheal-cheô, a tha comhdachadh Chuilinn,
Slan leis gach blà-shùil, 'th'air an Dùn, 's iad a' tuireadh!
Soraidh bhuan do'n luchd-ciùil, 's tric 'chuir sunnd orm is tioma—
Sheôl Mac-Criomthain thar sàil, is gu brath cha till tuilleadh.

Nuallan allt' na piob-mhoir a cluich marbh-rann an fhilidh,
Agus dearbh bhrat a bhàis mar fhalluing aig' uime;
Ach cha mheataich mo chridh' is cha ragaich mo chuislean,
Ged dh' fhalbham le m' dheôin, 's fios nach till mi chaoidh tuilleadh.

'S tric a chluinnear fuaim bhinn caoi thiom-chridh' Mhic-Criomthain,
'N uair 'bhios Gaidheil a' falbh thar an fhairge 'g an iomain—
O! chaomh thir ar graidh, o do thraigh 's rag ar n-imeachd;
Och! cha till, cha till, cha till sinn tuilleadh.

Translated by Sir Walter Scott:—

MacLeod's wizard flag from the grey castle sallies,
The rowers are seated, unmoored are the galleys,
Gleam war-axe and broad-sword, clang target and quiver,
As MacCrimmon plays, "Farewell to Dunvegan for ever!"

"Farewell to each cliff, on which breakers are foaming;
Farewell, each dark glen, in which red deer are roaming;
Farewell, lonely Skye, to lake, mountain, and river;
MacLeod may return, but MacCrimmon shall never!"

"Farewell the bright clouds that on Coolin are sleeping;
Farewell the bright eyes in the fort that are weeping;
To each minstrel delusion, farewell; and for ever —
MacCrimmon departs, to return to you never!"

'The Banshee's wild voice sings the death-dirge before me,
And the pall of the dead for a mantle hangs o'er me;
But my heart shall not flag, and my nerve shall not quiver,
Though devoted I go — to return again never!"

Too oft shall the note of MacCrimmon's bewailing
Be heard when the Gael on their exile are sailing:—
"Dear Land! to the shores, whence unwilling we sever
Return — return — return, we shall never!"

In the famous "Rout of Moy" MacCrimmon fell, and his premonition was fulfilled. In Skye his death was mourned by his sweetheart, who is made pathetically to lament his death, in the following lines which are those usually sung to the tune, "MacCrimmon's Lament":—

Dh' iadh ceo man stùc mu aodann Chulainn;
Gu' n d' sheinn a bhean shith a torgann mulaid;
Tha suilean gorm, ciùin, 's an Dùn ri sileadh;
O'n thriall thu bh'uainn, 's nach till thu tuille.

Cha till, cha till, cha till MacCriomthain,
An cogadh no sith cha till e tuille:
Le airgiod no ni cha till MacCriomthain;
Cha till gu brath gu la na cruinne.

Tha osag nan gleann gu fann ag imeachd
Gach sruthan 's gach allt, gu mall le bruthtach,
Tha ialt nan speur feagh gheùgan dubhach;
Ag caoidh gun d' fhalbh, 's nach till thu tuille.
Cha till, cha till, etc.

Tha'n fhairge fadheôidh, lan brôin a's mulad;
Tha'm bata fo sheôl, ach dhiult i siubhal,
Tha gaire nan tonn, le fuaim neo-shubhach,
Ag radh gun d' fhalbh, 's nach till thu tuille.
Cha till, cha till, etc.

Cha cluinnear do cheôl 's an Dùn mu fheasgair;
No Mactalla na mùr, le mùirn g'a fhreagairt:
Gach fleasgach a's oigh, gun cheôl gun bheadradh,
O'n thriall thu bh' uainn, 's nach till thu tuille.
Cha till, cha till, etc.

Translated by Lachlan MacBean:

O'er Coolin's face the night is creeping,
The banshee's wail is round us sweeping,
Blue eyes in Dùn are sadly weeping,
Since thou art gone, and ne'er returnest.

The breeze of the bens is gently flowing,
The brooks in the glens are softly flowing,
Where boughs their darkest shades are throwing,
Birds mourn for thee who ne'er returnest.

It's dirges of woe the sea is sighing,
The boat under sail unmoved is lying,
The voice of the waves in sadness dying
Say thou art away and ne'er returnest.

We'll see no more MacCrimmon's returning,
Nor in peace nor in war is he returning,
Till dawns the great day of woe and burning,
For him, for him, there's no returning.

These verses lose much in the translation. In the original they are remarkable for beauty of diction and for the depth of tender feeling they express, and one can easily understand the enduring impression they would make upon the minds of sorrowing emigrants, especially when sung to one of the sweetest minor melodies in the treasury of Gaelic music.

To this class belongs Evan MacColl's (a charter member of the Royal Society) "Beannachd Dheireannach an Eilthirich Ghailich,"—"The Highland Emigrant's Farewell," one of the best emigrant's songs in the language, the concluding lines of which are:

* * * * * * * * * *

Uair eile, 's gu bràth,
Beannachd bhlàth leat, mo dhuthaich!
Ged robh gu Lath'-luain
Falach-cuain ort bho m' shùil-sa,
Gu deireadh mo chuairt,
Gearr no buan, bi'dh mi 'g urnuigh,
O! Ard-righ nan dùl,
Beannaich duthaich mo ghràidh!

In this poem MacColl describes his father's feelings, overcome by strong emotion as the mountain peaks of his native land recedes from his view, and in turning away after the darkness has closed the scene, the stern-visaged Gael vows eternal devotion to his native land, and invokes a benediction upon its future. This poem, or song, composed to the tune, "Erin gu brath," has been sung in the Old Land and in Canada by at least two generations, separated by the wide Atlantic yet on both sides of the ocean, each remembering the close relationship betwixt them of kith and kin.

When the Scottish Gael found a lodgement in Canada, the songs of his race were not forgotten. That body of song was the common heritage of the Kelt, the world over, but the soul of song did not live on the poetry of the past only; it found its muse in the dense forest, on the rivers and lakes, and at the happy firesides of the settlements. Here in Canada, therefore, Gaelic poems and songs were composed in the style of the older minstrelsy. Some of them can be compared to the popular lyrics of the Highlands. The themes varied with the glories of sea and land, the beauties of nature with her rich colourings and varying moods; the heroism and devotion of the women — of mothers and daughters who bore the hardships of colonization with

courage and good cheer; the merriment of the home life, for alongside the hardships were situations which gave play to the lively wit and fancy of the buoyant Kelt, and these as well as the loves of the swains and maidens furnished rich material to the bard. Every settlement had its poets, and the connection between the life and the lyrics of the people was well maintained. Thus, the labours of the day were lightened by song, in the melodious speech of the fathers; the idea of exile was softened and the land of adoption became more and more a real home like the native land. But that native land was not forgotten, and "MacCrimmon's Lament," or the "Emigrant's Farewell" had still the power of awakening memories of the past:

"Is tric mi cuimhneach air tir mo dhùthchais,
Air tir nam beanntan 's nan gleanntan ùrar;
Air tir nan sgàrnaichean àrda, ruisgte,
Nan creagan corrach, 's nan lochan dùghorm."

TRANSLATED: —

"Dear land of my fathers, my home in the Highlands,
'Tis oft that I think on thy bonnie green glens,
Thy far-gleaming lochs, and the sheer sided corries,
Thy dark-frowning cliffs, and thy glory of Bens!"

Or,—

"Is toigh leam a Ghaidhlig, a bardachd 's a ceôl,
Is tric 'thog i nios sinn 'n uair bhiodhmaid fo leôn;
'S i dh' ionnsaich sinn tra ann an laithean ar n-ôig,
'S nach fag sinn gu bràth gus an laidh sinn fo'n fhoid."

TRANSLATED: —

"And the songs of the Gael on their pinions of fire,
How oft have they lifted my heart from the mire;
On the lap of my mother I lisp'd them to God;
Let them float round my grave, when I sleep 'neath the sod."

By the Restigouche or the St. Lawrence the peasant-poet sat and mused upon the days of yore, and to the gathering neighbours poured an oblation to the manes of his forefathers, such as the beautiful "Canadian Boat Song," said to have been translated from the Gaelic by Earl Eglinton:—

TRANSLATED:—

"Listen to me as when ye heard our father,
Sing long ago the songs of other shores;
Listen to me and then in chorus gather,
All your deep voices as ye pull your oars—

Chorus.

Fair these broad meads, these hoary woods are grand,
But we are exiles from our father's land.

From the lone sheiling of the misty island,
Mountains divide us and the waste of seas;
But still the blood is strong, our hearts are Highland
And we in dreams behold the Hebrides.

We ne'er shall tread the fancy-haunted valley,
Where, 'twixt the dark hills, creeps the small clear stream,
In arms around the patriarch banner rally,
Nor see the moon on royal tombstones gleam.

When the bold kindred, in the time long vanish'd,
Conquered the soil and fortified the keep,
No seer foretold the children should be banished,
That a degenerate lord might boast his sheep.

Come foreign rage! let discord burst in slaughter,
Oh! then, for clansmen true, and keen claymore!
The hearts that would have given their blood like water,
Beat heavily beyond the Atlantic's roar.

Fair these broad meads — those hoary woods are grand.
But we are exiles from our father's land.

There is doubt as to the authorship of this translation, some attributing it to Professor James Wilson; others to Hugh, 12th Earl Eglinton, among whose papers it was found. In March, 1896, I advertised in the Glengarry newspapers for the original and received in reply five Gaelic songs purporting to be the original of the Canadian Boat Song, but I could not accept any of them as being genuinely such. It is curious that Moore's Canadian Boat Song should also have been a translation from an old French song, popular in Poiton, according to Ernest Gagnon, Quebec.

Railing at his hard lot, a pioneer poet breaks out:

"Gach ceum a shiubhlas sinn feadh na duth'chsa,
Gur coille duth-ghorm i air fad,
Tha ruith gu siorraidh gun cheann no crioch oir',
Is beachainn fiadhaich tha innte gu pailt';
Cha'n fhaic sinn fraoch ann a fas air aonach,
Na sruth a caochan ruith soilleir glan,
Ach buig 'us geoban 's na rathadan mora
Na'n sluichd mhi-chomhnard le stumpan groid."

Fifty years later, however, this same poet casting his eye back, finds his muse is more cheerful. The log-houses are disappearing, so are the dense forests, the fauna is less formidable, the roads are improved, the fields are beautiful, and if the heather and the golden broom are not seen on the sloping foot hills, the verdure is at least luxuriant and pleasant to the eye; and he feels no compunction in placing the new in favourable contrast with the old.

The Gael is intensely religious. He turns to verse for adequate utterance when profoundly stirred with sacred thoughts. At the time of the first emigration to Canada, Dugald Buchanan, the greatest religious poet of the race, flourished. His spiritual songs were seized with remarkable avidity and were known in every cottage in the land. Seldom have religious verse in any language had such extensive circulation. Next to Holy Writ the early emigrant prized Buchanan, and many a log-cabin in the bush, rang, on Sabbath-day, with the chorus of his hymns. Canadian editions were printed, and they are still in use by some who could not tell whether the author had lived in the eighteenth (as he did) or in the nineteenth century, or whether he was a native of Canada or of Perthshire, so thoroughly have these hymns become a part of the Canadian Gaelic folk-song. Buchanan chose subjects which gave scope to his powerful imagination. For instance: "The Greatness of God," "The Sufferings of Christ," "The Day of Judgment," "The Skull," "Prayer," etc. He was known among the literary men of his time as a great poet. An account of an interesting interview between him and David Hume, the historian, has come down. These two were discussing the merits of some authors when Hume observed that it was impossible to imagine anything more sublime than the following lines, which he repeated:

> "The cloud-capt towers, the gorgeous palaces,
> The solemn temples, the great globe itself,
> Yea, all which it inherits shall dissolve,
> And like the baseless fabric of a vision —
> Leave not a wreck behind."

Buchanan admitted the beauty and sublimity of the lines, but, said, he could produce a passage more sublime, and repeated the following verses:

"And I saw a great white throne, and him that sat on it, from whose face the earth and the heaven fled away; and there were found no place for them. And I saw the dead, small and great, stand before God: and the books were opened; and another book was opened, which is the book of life: and the dead were judged out of those things which were written in the books, according to their works. And the sea gave up the dead which were in it; and death and hell delivered up the dead which were in them; and they were judged every man according to the works."

Hume, it is said, admitted the superiority of Buchanan's quotation, as an example of the sublime in literature.

After Buchanan came Patrick Grant, a sweeter, if a weaker poet. Grant's hymns have, from the time of their first appearance, been widely known and popular in Canada and are still read with pleasure and

profit in the Gaelic settlements. One or two examples will show the bright spirit that pervaded them—a contrast to Buchanan's sombre earnestness:

TRANSLATED:—

(1) "Hark! Sion loud *rings* her King's high praises,
She *sings* and raises her voice,
His love to proclaim who *came* to aid her,
His *name*, who made her his choice.
Hallelujahs *prolong* the song that's given,
Among wide Heaven's bright host,
And those who while here, lies *near* to Jesus
That *dear* sound pleases them most."

These lines may also serve as an example of that assonance which is characteristic of Gaelic versification,— the "leonine rhyme."

TRANSLATED:—

(2) "In ilka trial we hae tae bear
We'll nestle near him, there's shelter there,
For if we trust Him, whate'er betide us,
He'll save and guide us for ever mair.

His frien's on earth He will ne'er disclaim,
But bring wi' joy a' that loe his name,
Frae His dear presence nae mair tae sever,
But share for ever His Lasting Hame.

The year 1786 witnessed the arrival in Canada of a man of note, whose life-work will not be forgotten among the Gael. Rev. Dr. James Macgregor, the Gaelic Hymnist was born in 1759, at Portmore, in Perthshire. He settled at Pictou as a missionary, and preached in Gaelic to the Highlanders. A talented and scholarly divine, he composed hymns and religious poems which became popular among the Highlanders of Nova Scotia and Cape Breton. They were sung in almost every family, and the testimony of the early ministers of the Gospel in the Maritime provinces is to the effect that these poems made a deep impression on the people. While known, they were not widely used in Upper Canada, at least, I have not been able to trace them much beyond the manses of the Gaelic speaking clergymen of Ontario, but MacGregor's collection sold well in Scotland and in Nova Scotia. In the west Rev. F. J. MacLeod published a book of hymns and spiritual songs, at Toronto, which found acceptance among the Kelts of northern and western Ontario—Victoria, Grey and Bruce counties. A poet better known that Mr McLeod, was the Rev. Donald Monro, whose volume of Gaelic verses appeared in 1848, with an encouraging list of subscribers. Mr. Monro was a native of Kilmartin, Argyllshire, and settled in Glengarry in the forties, removing thence to the township of Finch where he enjoyed a lengthened ministry. He died in

February, 1867, in the 78th year of his age, but still lives in the well gotten up volume of Gaelic poetry which he gave to his countrymen.

The popular songs of the people, however, must be their love songs, and in this branch of the subject the Kelto-Canadian had a rich treasury. As the French-Canadian inherited the folk-song of Old France, so the Gael of Canada did the songs of the Scottish Highlands. Love songs live long. To-day can be heard songs crooned in Nova Scotia or in Ontario, whose origin is lost in the mists of time, or of authors who lived many generations ago in Scotland. Such a song, for instance, is "Fear a Bhata," "The Boatman," one of the finest of our Gaelic love songs:

TRANSLATED:—

"My friends oft tell me that I must sever
All thought of thee from my heart for ever;
Their words are idle—my passion's swelling,
Untamed as ocean, can brook no quelling.

My heart is weary with ceaseless wailing,
Like wounded swan when her strength is failing,
Her notes of anguish the lake awaken,
By all her comrades at last forsaken.

Another example would be: "Ho ro mo nighean donn bhoidheach," sung by a chorus of children in Toronto not later than last June. The translation of a verse will show the intensity of the sentiment pervading it:

TRANSLATED:—

"O maid whose face is fairest,
The beauty that thou bearest,
Thy witching smile the rarest,
Are ever with me.

"Though far from thee I'm ranging
My love is not estranging,
My heart is still unchanging
And aye true to thee.

"Thy smile is brightest, purest,
Best, kindliest, demurest,
With which thou still allurest
My heart's love to thee."

But the settlers themselves and their descendants to the present time composed love songs which obtained popular recognition, many of which have seen the light of the day on pages of books or periodicals, but many, very many, still remain to be collected and preserved as interesting specimens of the Gaelic muse in Canada.

Some of the better known Gaelic poets of Canada are: Dr. James Macgregor, Rev. D. B. Blair, Rev. A. MacLean Sinclair, Evan MacColl,

Rev. Donald Monro, Rev. F. J. MacLeod, Hugh MacColl, Archibald MacKillop, A. Gordon, Alexander MacMillan, Hugh MacCorquodale, Neil Clark, Mrs. Angus MacKay, Mrs. McKenzie, Dr. J. MacLeod, Donald Grant, Donald Campbell, D. MacFarlane, Angus Carmichael (author of "Venus of the Gael," etc.), James MacMaster, Miss Catherine Cameron, Mrs. John MacDonald.

Quite recently, while on a visit in the county of Bruce, I came across a number of Gaelic songs composed by Mr. J. B. Macdonald, a respected citizen of Tiverton, a specimen verse of which I shall transcribe to show that patriotism and vitality still characterize the sons of Ossian:

O, 's ann a'n America a tha mi an dràsda,
Fo dhùbhar na coille nach teirig gu bràth,—
'S'n uair dh' fhalbhas an dùbhlachd 'sa thionnd'as am blàths
Bidh drisean 'us biùlan 's flùth'r orra fàs.

Ach's truagh nach robh mise 'n Tiridh mar bha,
Ged bhithinn gun sgillinn dar ruiginn an traigh;
Bu shunndach a bhithinn 'n uair dh' eireadh an làn,
Dol a dh' iarraidh nan siolag gu iochdar traigh-bhaigh.

Tiridh mo chridhe, Tiridh mo ghaoil,
Far am bithinn am mireag 'sa ruith air an raon',
'S bho 'na thug mi mo chùl ris do dhuthaich nan craobh,
'S e dh' fhag mi fo mhulad nach grunnaich mi 'n caol.

The Gael had his "Golden Age," and it was an age of poetry. Its traditions have floated down the centuries to our own times, and are met with in popular songs, one of which may fitly close this sketch:

"LINN AN AIGH"—"THE HAPPY AGE."

TRANSLATED:—

When all the birds in Gaelic sang,
Milk lay like dew upon the lea;
The heather into honey sprang,
And everything was good and free.

No tax or tribute used to fall
On honest men, nor any rent;
To hunt and fish was free to all,
And timber without price or stent.

There was no discord, war or strife,
For none were wronged and none oppressed;
But everyone just led the life
And did the thing that pleased him best.

All lived in peace, there was no sort
  Of prey or plunder, feud or fight;
There was no need of any court —
  Their hearts contained the law of right.

For gold or silver no one cared,
  Yet want and woe were never near;
All had enough, and richly fared,
  And none desired his neighbour's gear.

Love, pity, and good-will were spread
  Among the people everywhere;
From where the morning rises red
  To where the evening shineth fair,
        When all the birds in Gaelic sang.

VI.—*Totemism: A Consideration of its Origin and Import.*

By CHARLES HILL-TOUT.

Hon. Secretary of the Ethnological Survey of Canada, etc.

(Communicated by Honorary Secretary and read May, 19, 1903.)

Two years ago I had the honour to present to the Society a short paper on the subject of Totemism as it obtains in tribal society in British Columbia.

The scope of the present paper is more comprehensive; it aims at a consideration of the subject from a general point of view.

The doctrine of totemism has of late much exercised the minds of anthropologists, and there has been a considerable increase in the literature upon it. This has not, unfortunately, resulted in an acceptable solution of the problem of totemism, but rather the reverse. It has brought out in a painfully clear manner that American and European students hold widely-differing views upon the subject, and appear to look at the question from a fundamentally different standpoint. Even their terminology seems to have little in common.

This has apparently come about from the fact that students of this country have dealt with data drawn almost exclusively from American sources, while those of Europe seem to have fixed their attention more particularly upon data gathered in Australia and other parts of the world.

This would seem to suggest that the totemism of tribal man in America is different from that found among primitive peoples elsewhere. But this certainly cannot be the case. Totemism, wherever found, in its naked and virgin state, is demonstrably the outcome of the mind of savage man contemplating the relations existing between himself and his physical environment, that is of *anthropopathic* conceptions of the universe, and in its fundamentals must of necessity be everywhere the same. The difference, if difference there be, will be found to lie partly in the attitude of the student himself and partly in the fact that too much stress has been laid by certain European exponents of totemism upon subsidiary features of it, which, as I shall attempt to show, are not really essential elements, but only, more or less, local adjuncts or accidents, which differ materially in number and character in different centres and among different peoples. If these concomitants of totemism, mostly social, be set aside and the underlying concept be regarded alone, totemism will be seen to be the same in all parts of the world.

The American student may be said to possess a certain advantage over others in his study of the subject. Nowhere in the world has primitive man received such close and systematic study by trained observers as in this country, and nowhere can we find a wider or more varied range of culture than among the aborigines of this continent. Every condition of tribal society appears to exist here. There are tribes in the Matriarchal state, tribes under Patriarchal rule, and tribes in all stages of transition between the one and the other. He has, therefore, an ideal field for the study of primitive institutions and concepts and should, with due care, be able to arrive at the heart of things.

I will, therefore, begin this consideration of the subject by a brief statement of what is regarded by leading American students as the doctrine of totemism. And as the late Director of the Bureau of American Ethnology, so recently as July last set forth briefly in an article in *Man*, what may be considered the prevailing view of the doctrine in this country, I cannot do better than cite his statement of the case in his own words. He writes: "A group of Amerind tribes occupying a limited part of the Dominion of Canada and the United States are known as Algonquins; they belong to a distinct linguistic stock in which many languages are spoken. Among these tribes the word 'totem' or its variant is used, and these are the languages from which the word comes. The word is derived from a root which signifies clay. Among the Algonquian tribes clay was used to paint the face and body with the heraldic devices [that is the totem symbols] of a group of persons.... The group is composed of such persons as reckon consanguineal kinship only through the mother; thus, the mother and her brothers and sisters and their mother with her brothers and sisters, belong to the group, and the kinship may be reckoned in the same manner through an indefinite number of generations. This group we call a *clan*, but the Algonquians call it a *totem*, thus clan and totem are synonymous.... There are other tribes in which the clan group is replaced by what we call the *gentile* group. This group is like that discovered among the Latin tribes, and embraces those persons who reckon kinship through the father with his brothers and sisters, including their father and his brothers and sisters. Thus the mother's group and the grandmother's group are excluded.... When the second group is found we call it a gens.... In America we call the name of the clan and also the name of the gens its totem, and totemism is considered a method of naming. Among some tribes the child on coming to puberty takes a new name, and this name is called its totem.... In every tribe among the Amerinds societies are organized, which we formerly called 'medi-

cine societies' and then 'religious societies'. . . . These societies are also named, and the names of the societies are their totems, so that totemism pertains to individual names, to clan names, to tribal names, and also to society names.

"The name which the individual assumes at puberty is the totem name of the individual; it is also the name of the thing for which the individual is named. . . . When shamanistic societies are organized, their names are also their totems, and apply to the societies as well as to the things to which they are devoted. This is the Amerindian custom, and is also the custom of American students.

"In tribal society we find very interesting superstitions about names, for the name is held to be an inherent attribute or property of the thing; again, the object from which the puberty name of the individual is taken becomes his tutelar deity. In like manner the totem name of the clan, the gens, and the tribe severally become tutelar deities of these bodies. Such are the customs and superstitions of the Amerinds about names, and we call this doctrine of naming totemism."

Now at first sight this "doctrine of naming" seems to be lacking in scientific precision. Indeed, Major Powell's critics have found fault with it upon this very ground. One of them says: "it is difficult to see the advantage of a system of nomenclature where everything is called by the same name."[1] Another says: "I must confess to feeling a little bewildered by this terminology and I venture to think it will not prove of much service in advancing our knowledge."[2] But this is not really the case. To regard it in this light is to fail entirely to appreciate the American point of view.

To rightly comprehend how the word totem may logically and consistently include so many apparently diverse ideas we must examine into the nature of those ideas to see if they are really as diverse as they appear to be; and are not merely so many different expressions of a common underlying concept.

Upon analysis we find the following elements comprised under this "doctrine of naming":—

A
1. The name acquired by a person during the puberty ceremonials.
2. The object or thing from which the name is taken.
3. The symbol or representation of the object.

B
1. The name of a group of people united by ties of consanguinity.
2. The object from which that name is taken.
3. The crest or kindred-symbol or representation of the object.

[1] *Man.*, 1902, Article 85.

[2] Presidential address of Dr. A. C. Haddon before the Anthrop. Sect. of the B.A.A.S., Belfast, 1902.

C
1. The name of a "medicine" or "religious" society.
2. The object or thing to which that society is devoted.
3. The emblem, symbol or representation of that object or thing.

Now a brief examination of these categories shows us that the same concept underlies them all. In each we have the same three elements: name, object, and symbol. In each the object is the source of the name, and in each the object is the same thing, viz., a tutelary guardian spirit. It is in this concept of a ghostly helper or tutelary spirit that we find the connecting link. *This* is the essential element of totemism. "This *is* totemism" in its pure and naked state, *i.e.*, shorn of its social accessories. And in applying the same name to all three elements we are, as Major Powell has shown, but following the custom of the natives themselves and regarding the subject from *their* point of view. In the Algonquian's mind, we may be sure there was no confusion in the application of the word *totem* to these several phenomena, for to him they were but different expressions of one and the same thing; nor need there be in the mind of the student when he has once rightly apprehended the concept which underlies the term.

In the philosophy of savage man the *name* of a thing is something more than a mere label, or mark of distinction; it is an essential part or attribute of the thing itself. It is of prime importance to appreciate this fact for a right understanding of it makes clear a good many strange and obscure customs and superstitions among primitive peoples. To adopt or receive the name of an animal or plant or other object, was in the mind of the savage to be endowed with the essence or spirit of that object, to be under its protection, to become one with it in a very special and mysterious sense. This becomes clear from a study of names and the customs and superstitions connected with them. Among these may be instanced the habit of avoiding personal names in direct address. Major Powell has recorded an interesting example of this. He was at one time travelling in company with a band of Kaibab Indians, the young chief of whom was known to white men by the name Frank. Major Powell sought on several occasions to learn his Indian name, but could not succeed. He then endeavoured to notice the term by which the chief was addressed by others of the tribe, but invariably some kinship term was employed. One day, however, the chief and his wife quarrelled, and in her anger the wife called him Chuarumpik ("Yucca-heart"). Later, Major Powell referred to the subject and questioned the chief about it, who explained and apologized for the great insult his wife had heaped upon him by thus mentioning his name, but said that she was excused by the great provocation he had given her. The "insult" lay in calling him by his real or "mystery" name.

Everard F. im Thurn gives the following account of the name system of the Indians of Guiana, "which," says Mallory, "might have been written with equal truth about some tribes of North America":—"The system under which the Indians have their personal names is intricate and difficult to explain. In the first place, a name, which may be called the proper name is always given to a child soon after birth. It is said to be proper that the peaiman or medicine-man, should chose and give the name. . . . The word selected is generally the name of some plant, bird or other natural object. But these names seem of little use, in that owners have a very strong objection to telling or using them, apparently on the ground that the name is part of the man, and that he who knows the name has part of the owner of that name in his power.[1]

The close relation between the person and his name is again seen in the practices of shamans and witches. In their formulas relating to love and killing or maiming, the name of the victim or of the person whose affections it is desired to win, is always specifically mentioned; for the Indian believes that injury will result from malicious handling of his name as surely as from a wound inflicted on any part of his physical organism. "This belief," writes Mooney in his article on the 'Sacred formulas of the Cherokees,'[2] "was found among the various tribes from the Atlantic to the Pacific and has occasioned a number of curious regulations in regard to the concealment and change of names. Should his prayers have no apparent effect when treating a patient for some serious illness the shaman sometimes concludes that the name is affected and accordingly goes to water, with appropriate ceremonies and christens the patient with a new name. He then begins afresh using the new name."

Teit, writing of the Thompson Indians says: "It is believed that all animals have names of their own which may be revealed by the guardian spirits. The knowledge of these names gives a person additional power over animals. A man who, knowing the name of the grisly bear, for instance, addresses him, gains so much more power over him that the bear at once becomes gentle and harmless."[3]

In a note upon "The Religious Ceremony of the Four Winds or Quarters, as observed by the Santee Sioux," Miss Alice Fletcher remarks:

"A name implies relationship, and consequently protection; favour and influence are claimed from the source of the name whether

[1] Tenth Report of Bureau of American Ethnology, 1888-89, pp. 44-5.

[2] Seventh Annual Report Bureau of Amer. Eth., p. 343.

[3] The Thompson Indians of B.C. Memoirs of the Amer. Mus. of Nat. Hist., Vol. II, p. 355.

this be the gens or the vision. A name therefore shows the affiliation of the individual; it grades him, so to speak, and he is apt to lean upon its implied power..... The personal name (and also the kinship term in some cases) among Indians therefore indicates the protecting presence of a deity, and must, therefore, partake of the ceremonial character of the Indian's religion."

The practice among some savages of interchanging names is founded upon the same or kindred beliefs. We also see another illustration of the same idea in the care and jealousy with which each family or clan guards and retains for its own peculiar use its own list of personal names. These names are regarded as peculiarly sacred, inasmuch as they are intimately connected with the lives and histories of their owners or their ancestors; and for an outsider to appropriate one of them would be the deadliest offence and would result in his speedy death.

It is clear from the foregoing, then, that an object and its name, particularly when that object is a "mystery" object, was one and the same thing in the eyes of the savage and hence his calling them by the same name.

And with regard to the third element of the categories, the symbol or representation of the object, it was the same thing. Nelson informs us that the Eskimo possess masks representing their totem animals, the wearers of which are believed to become actually the beings represented, or at least to be endowed with their spiritual essence.[1]

Dorsey, writing in his "Study of Siouan Cults," concerning the origin of the buffalo and their "mysterious" power says: "Therefore, when a man can hardly be wounded by a foe, the people believe that the former has seen the buffalo in dreams or visions and on that account has received mysterious help from those animals. All such men who dream of the buffalo *act like them and dance the buffalo dance. And the man who acts the buffalo is said to have a real buffalo inside him and a chrysalis lies within that part of the body near the shoulder blade.*"[2] Similar views are held by the Salish tribes.

Turner, writing of the religion of the Hudson Bay Eskimo, says: "The spirit [*i.e.*, the tutelary guardian] is often in a material form in the shape of a doll carried somewhere about the person."[3]

Lynd, writing of the Dakotas, says: "Frequently the devout Dakota will make images of bark or stone, and after painting them in various ways and putting sacred down upon them will fall down and worship before them, praying that all danger may be averted from him

[1] Eighteenth Annual Report Bureau of Amer. Eth., pp. 394-5.

[2] Eleventh Annual Report Bur. Amer. Eth., 1889-90, p. 477.

[3] *Ibid.*, p. 194.

and his. It must not be understood, however, that the Dakota is an idolator. It is not the image that he worships,.... *but the spiritual essence which is represented by that image, and which is supposed to be ever near it.*"[1]

The coast tribes of British Columbia hold similar views; and the accounts that have been given of fetishism in different parts of the world everywhere reveal the same belief. The Polynesian taboo beliefs with regard to certain objects being the shrine or habitation of their gods is another illustration of this belief. On the island of Nukunono Fakaafo was a stone wrapped about with matting, and held so sacred by the natives that only the king durst view it, and even he only once a year when it assumed a fresh suit of matting. This stone or idol or fetish was termed by the natives the Tui Tokelau or Lord of Tokelau and was regarded as the personification of the god.[2] The Ark of the Israelites belongs to the same class of beliefs.

It becomes clear then that in the mind of the savage the name of a thing, the symbol or representative of that thing, and the thing itself is all one and the same. They are to him only so many different expressions of the same concept. Hence there is no inconsistency in his designating them all by a common name.

To follow the Algonquian custom, then, and call the several elements of our categories by one and the same term is, I submit, neither illogical nor inconsistent. But in order that this may become the more apparent it may be well to consider here briefly the nature of this fundamental concept of primitive man of which totemism, in one form or another, is everywhere the outward and visible sign. For, as I remarked in my former paper, we can best apprehend the philosophy of savage customs and beliefs when we view things from the point of view of savage intelligence.

A particularly suggestive and luminous exposition of the mental attitude of the Zuñi toward the universe is given by Cushing in his article on Zuñi fetishes in the Second Annual Report of the Bureau of Amer. Eth. As this report is now out of print, and as the Zuñi savage does not differ greatly from other savages elsewhere, it will not be out of place if I cite a few pertinent passages from it.

"The Zuñis," he writes, "suppose the sun, moon and stars, the sky, earth, and sea, in all their phenomena and elements; and all inanimate objects, as well as plants, animals, and men, to belong to one great system of all-conscious and inter-related life in which the degrees of relationship seem to be determined largely, if not wholly by the degrees of resemblance. In this system of life the starting point is

[1] Minn. Hist. Soc. Coll., Vol. II, pt. 2, p. 67.

[2] Turner, "19 years in Polynesia."

man, the most finished yet the lowest organism, at least, the lowest because the most dependent and least mysterious. In just so far as an organism, actual or imaginary, resembles his is it believed to be related to him and correspondingly mortal; in just so far as it is mysterious is it considered removed from him, further advanced, powerful and immortal. It thus happens that the animals, because alike mortal and endowed with similar physical functions and organs are considered more nearly related to man than are the gods: more nearly related to the gods than is man because more mysterious, and characterized by specific instincts and powers which man does not of himself possess.... In like manner the supernatural beings of man's fancy—the 'master existences'—are supposed to be more nearly related to the personalities with which the elements and phenomena of nature are endowed than to either animals or man; because like those elements and phenomena and unlike man and animals they are connected with remote tradition—— and, therefore, are considered immortal."

To the above should be added the statement that all these beings are given by the Zuñis the forms either of animals, of monsters compounded of man and beast, or of man. The animal gods comprise by far the larger class.

Mrs. Erminnie A. Smith, writing in the same Report upon the "Myths of the Iroquois," remarks: "All the mysterious in nature, all that which inspired them with reverence, awe, terror, or gratitude, became deities or beings like themselves endowed with supernatural attributes, beings whose vengeance must be propitiated, mercy implored, or goodness recompensed." Riggs, writing on the Mythology of the Dakotas, remarks: "They pray to the sun, earth, moon, lakes, rivers, trees, plants, snakes, and all kinds of animals and vegetables — many of them say, to everything, for they pray to their guns and arrows — to any object artificial as well as natural, for they suppose that every object, artificial as well as natural, has a spirit which may hurt or help." [1]

And Turner writes, concerning the beliefs of the Eskimo about Hudson's Bay: "All the affairs of life are supposed to be under the control of spirits, each of which rules over a certain element..... Each person is supposed to be attended by a special guardian who is malignant in character, ever ready to seize upon the least occasion to work harm upon the individual whom it accompanies." [2]

Bearing in mind, then, this attitude of savage man towards nature, and his intense belief in the activity and omnipresence of the "ghosts" of things, it is not difficult to perceive how the totem concept was

[1] Eleventh Annual Rept. Bur. Amer. Eth., 1889-90, p. 434.

[2] *Ibid.*, p. 194.

evolved. Surrounded as he felt himself with beings and agencies disposed rather to harm than to befriend him, and being unable by the limitations of his intelligence, to discern the true relations between causes and effects, he is led irresistibly to attribute all his blessings to friendly powers and all his ills to hostile ones. He assumes immediate causal relations where they do not exist, and not knowing or understanding the true causes of things takes for them some object in his immediate environment.

"A Kaffir broke a piece off the anchor of a stranded vessel and soon after died. Ever after the Kaffirs regarded the anchor as something mysterious, divine, and did it honour by saluting it as they passed by, with a view to propitiate its wrath." [1]

The Yakuts, Wuttke informs us, first saw a camel during an outbreak of smallpox and in consequence pronounced the animal to be a hostile deity who had brought the disease among them.[2] These are typical cases of the way in which the savage reasons. To the Kaffirs the anchor was clearly the cause of the man's death; and to the Yakuts the camel the cause of the smallpox. There was no doubt in their minds. Did not the facts speak for themselves? Another savage connects some object in his mind with certain good fortune that has happened to him, and thereafter that object becomes his fetish, his tutelary deity to be consulted or appealed to in all emergencies. An American savage chose the crucifix and a little image of the virgin as his *manitus* after he had found, as he believed, that they had protected him on sundry occasions against the arrows of his enemies." [3]

It is then, in these beliefs common to savage man the world over that we find the *raison d'être* of totemism, and under this term I include the kindred phenomena of fetishism; for the explanation of the one is the explanation of the other. Between the fetish so-called and the totem, on its religious and magical side, that is, in its *essential* character, I can perceive no difference at all. They are equally the outcome of the *anthropopathic* apprehensions of the universe by savage man. So also is the *Taboo*, the religious ban of the Polynesians. Among American savages we find all three phases in various stages of development. In the list of personal totems of the Thompson Indians given by Teit in his Memoir on that tribe, and which I cited in my former paper, we find exactly the same objects, and they have the same characteristics as those which become the *fetish* of the African savage. Waitz's definition of the fetish is equally a definition of the personal

[1] Quoted by Schultze in his "Fetishism" from Alberti's, die Kaffern.

[2] Wuttke, Gesch. d. H. I. 72, cited by Schultze.

[3] Charlevoix Journal historique d'un voyage de l'Amérique Septentrionale, Paris, 1774, p. 387.

Sulia of the Salish: A fetish, he says, is an object of religious veneration wherein the material thing and the spirit within it are regarded as one, the two being inseparable. And for the matter of that so also is that given by Dr. Tylor. "Fetishism," he writes, is "the doctrine of spirits embodied in, or attached to, or conveying influence through certain material objects."[1] Indeed, if one sought to give a definition of the *Sulia* of the Salish, or the "*waqube*" of the Omaha and Ponka, it would be impossible to find a more exact definition than this of Dr. Tylor. The only difference between the African fetish and the *Sulia* of the Salish, perceivable to the observer, is the manner in which they are severally acquired. Chance seems to be the chief factor in determining the acquisition of the African fetish, whereas among the Salish, dreams or visions are the usual source of their *Sulia*. This is also the manner of acquisition in several other North American tribes. But if the subject be regarded from a world-wide point of view we shall find that the totem or fetish is acquired in a variety of ways and that of these accidental coincidence determines a very large proportion. Among North American savages the dream or vision is the usual way, but not exclusively so. Totems are also frequently acquired by their owners by direct and personal contact with the object when out hunting or fishing. The origin of many of the clan totems of the North-west Coast tribes are accounted for in this way. Some American tribes chose their personal totems by a method of divination. The fetishes of the Zuñis, which take the place of the *Sulia* of the Salish, are chiefly stone objects, and as the tutelary deities of the Zuñis are mostly animals, these stone objects are the representations of them. The most highly-prized of them "are natural concretions in which the evident original resemblance to animals has been heightened by artificial means." All these fetishes are supposed to be either actual petrifaction of the animals they represent or were such originally. The Zuñis say concerning them: "Whomsoever of us may be met with the light of such great good fortune may *see* (discover, find) them and should treasure them for the sake of the sacred (magic) power which was given in the days of the new. For the spirits of the Wa-ma-à-hâ-i still live, and are pleased to receive from us the Sacred Plume (of the heart—Lä-sho-a-ni), and sacred necklace of treasure (thlâ-thle-a); hence they turn their ears and the ears of their brothers in our direction that they may hearken to our prayers (sacred talks) and know our wants."[2] They are supposed to have originated in the following manner. In "the days of the new" the Sun-Father created from his own being

[1] "Primitive Culture" II, p. 132.

[2] Zuni Fetiches. Second Annual Rep. Bur. Amer. Eth., p. 15.

two children. These, perceiving the weakness of mankind, "the finished beings" of the earth, sought to protect them from the "animals of prey" and whenever they came across in their wandering over the earth one of these animals, "were he a great lion or a mere mole," they struck him with the lightning of their magic shields and instantly he was shrivelled and burnt to stone. Then they thus addressed them: "That ye may not be evil unto men, but that ye may be a great good unto them have we changed you into rock everlastingly. By the magic breath of prey, by the heart that shall endure forever within you, shall ye be made to serve instead of to devour mankind."[1]

On the Isthmus of Tehuantepec when a child was about to be born the relatives drew on the floor figures of animals, one after another, and the one that remained when the infant was born became its totem. A somewhat similar custom prevailed in Samoa.

The difference, then, between the "totem" here and the "fetish" there is clearly seen to lie mainly in the way in which they are severally acquired. In character they are everywhere the same.

It is not needful to dwell longer on this point. Already there is a pretty general concurrence of opinion among anthropologists that the fetish and the personal totem is one and the same thing; or, at any rate, that the two have their origin in the same animistic concept; the point in dispute is rather the relation existing between these and "clan totemism," which we must now proceed to consider.

In this country the majority of students hold the view that the "clan" totem is but a natural development along social lines, of the personal totem. And not only the clan totem, but the society or fraternal totem as well. They are irresistibly led to this conclusion from the data before them. The attitude of the clansmen and of the members of a society to their respective totems is everywhere seen to be the same as that of the individual to his personal totem and the same relation exists between them.

I pointed out just now in the analysis of the elements which enter into American totemism that the three series or categories are intimately connected by the common underlying concept of a tutelar spirit or ghostly helper, which in the first case is confined to the individual, in the second to the clan or gens, and in the third to the society or brotherhood. Now, it appears to me, that if we are able to discover a clear instance or two of a personal totem passing by inheritance to the family or relatives of its owner, and thus becoming a common, family totem, we shall be perfectly justified in assuming that the family totem may be enlarged into the clan or gens totem, inasmuch

[1] Zuni Fetiches. Second Annual Rept. Bur. Amer. Eth., p. 14.

as the clan or gens is but a group of families[1] connected by ties of consanguinity. The main objection brought against this view of the matter by Mr. Andrew Lang and others is that the personal totem is not transmissible or hereditable. But is not this objection contrary to the facts of the case? We have abundant evidence to show that the personal totem *is* transmissible and hereditable. Even among tribes like the Thompson, where it was the custom for every one of both sexes to acquire a guardian spirit at the period of puberty we find the totem is in some instances hereditable. Teit says in his detailed account of the guardian spirits of the Thompson Indians, that "the totem of the shamans are sometimes inherited directly from the parents;" and among those tribes where individual totemism is not so prevalent, as, for instance, among the coast tribes of British Columbia, the personal totem of a chief or other prominent individual, more particularly if that totem has been acquired by means other than the usual dream or vision, such as a personal encounter with the object in the forest or in the mountains, is commonly inherited and owned by his or her posterity. It is but a few weeks ago that I made a special enquiry into this subject among some of the Halkomelem tribes of the Lower Fraser. "Dr. George," a noted shaman of the Tcil'qe'ek, related to me the manner in which his grandfather had acquired their family totem, the bear; and made it perfectly clear that the bear had been ever since the totem of all his granfather's descendants. The important totem of the *Sqoiàqî* which has members in a dozen different tribes of the coast and Lower Fraser Salish, is another case in point. It matters little to us *how* the first possessor of the totem acquired it. We may utterly disregard the account of its origin as given by the Indians themselves, the main fact for us is, that between a certain object or being and a body of people, certain mysterious relations have been established, identical with those existing between the individual and his personal totem; and that these people trace their descent from and are the lineal descendants of the man or woman who first acquired the totem. Here is evidence direct and ample of the hereditability of the individual totem and American data abound in it.

Miss A. Fletcher in her close and detailed study of the Omahas, was led to the conviction that the gentile totems of that tribe, and by implication those of others of the Siouan stock, were derived from the personal totems of leading members of the tribe. She writes: "As totems could be obtained but in one way—thro' the rite of vision—the totem of the gens must have come into existence in that manner and must have represented the manifestations of an ancestor's vision, that of a man whose ability and opportunity served to make him the founder

[1] I here of course use the terms "family" in its restricted sense as applied to the subdivisions of the clan and gens.

of a family, of a group of kindred who dwelt together, fought together and learned the value of united strength."[1]

Dr. F. Boas was led to the same conclusion with regard to the totems among the Kwakiutl Indians. He writes: "We have to deal here with the elementary idea of the acquisition of a guardian spirit which has attained its strongest development in America. Its specific character on the North Pacific Coast *lies in the fact that the guardian spirit has become hereditary.* This is the case among the northern tribes of British Columbia. It is also the case among the Kwakiutl and among the Chinook."[2]

Ensign Niblack arrived at similar conclusions with regard to the clan totems of the Haida-Tlingit. He writes: "From their nature totems are in a state of flux. Clans tend to become phratries, split up into sub-phratries, sub-phratries decay and finally disappear. An individual distinguishes himself, becomes wealthy and hence a leading man of the village. His totem or indeed, his individual crest or sub-totem, may have been an obscure one. As he rises, its importance in the tribe rises with him. Under his successors the totem widens its numbers, influence, and finally eclipses other clan totems which eventually melt away or are incorporated with it. In this evolution we see the sub-totem grow into the clan totem."[3]

And if I may be permitted to refer to my own work, I may state that I was led independently to form the same opinion from my study of the Salish tribes before I was even aware that others had come to this conclusion.

This is likewise the view taken by the officers of the Bureau of American Ethnology and, as far as I have been able to learn, that of the majority of students on this continent.

There must be some force, I submit, in the evidence on this head which thus leads so many students, working independently of each other, to the same conclusion.

Some European students have clearly recognized this force. The author of "*Totemism*" in his consideration of Miss Fletcher's paper remarks in "Golden Bough,"[4] "It is quite possible that as some good authorities incline to believe, the clan-totem has been developed out of the individual totem by inheritance."

Mr. N. W. Thomas is apparently inclined to go even further and take the same view as that suggested in my former paper, and more

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[1] The Import of the Totem. (Salem Press, Mass., 1897).

[2] The social organizations of the Kwakiutl Indians. Report U.S. Nat. Mus., 1895, p. 393.

[3] The Coast Indians of Southern Alaska and Northern B.C., Wash.

[4] *Golden Bough* iii, p. 419, note 5.

specifically dealt with here, but apparently from independent study of the subject, viz.: that "the basis of individual totemism seems to be the same as that of fetichism." Elsewhere in the same article he writes: "This view [*i.e.*, of the indwelling obsessing spirit of the totem in its owner] suggests that the interpretation suggested for individual totemism can also be applied to clan totems."[1]

And even Mr. Andrew Lang, writing in his recent paper on "The origin of Totem names and beliefs," remarks: "Though the attitude of a private person to his *nagual,* or of a magical society to its protective animal, may often closely resemble the attitude of the group to its hereditary totem, still the origin of this attitude may be different in each case."[2] Thus, while admitting the force of the evidence in this connection, he is led to explain it away or regard it as different, partly because he is under the impression that the personal totem is not hereditable, but more particularly because of a singular misconception he has regarding the transmissibility of male property and rights under matriarchy. He argues thus: Totemism is a phenomenon peculiarly characteristic of tribal society under mother-right, and though it may occasionally descend to the later state of father-right, it rightly belongs to, and had its origin under, the former. Now, under these conditions descent is reckoned in the female line; how then can a *man* become the founder of a family and transmit his personal totem to his children?" These are not his actual words, but I think he will admit that they state his position accurately. Thus, in his criticism of "Miss A. Fletcher's theory," he writes: "The conclusion of Miss Fletcher's valuable essay shows at a glance that her hypothesis contains the same fundamental error as that of Dr. Wilken, namely the totem of the kin is derived from the *manitu* or personal friendly object of an individual, a male ancestor. This cannot, we repeat, hold good for that early stage of society which reckons descent in the female line, and in which ancestors do not found houses, clan names or totem-kin." And in writing of the view expressed by myself, he says: "Mr. Hill-Tout has evolved a theory out of the customs of the aborigines of British Columbia, among whom 'the clan totems are a development of the personal or individual totem or tutelar spirit.' The Salish tribes, in fact, seek for '*Sulia,* or tutelar spirits,' and these 'give rise to the personal totem,' answering to *manitu, nyarong. nagual* and so forth. 'From the personal and family crest is but a step to the clan crest.' Unfortunately *with descent in the female line, this step cannot be taken.* Interesting as is Mr. Hill-Tout's account of the Salish Indians, we need not dwell longer on an hypothesis which makes village communities prior to the evolution of totemism."

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[1] *Man,* August, 1902, Art. 85.

[2] Folk Lore, Vol. XIII, No. 4, Dec. 1902.

I remarked just now that the difference between the American and European views of the doctrine of totemism was due partly to the attitude of the students. This becomes clear from the above citations from Mr. Lang's article. He is unable rightly to appreciate the evidence brought together by American students in support of the views herein set forth, because of certain prepossessions. One of these, as I have shown, is his belief that the personal totem is not hereditable, and the other is that group totems could not have arisen from the personal totem as claimed by Miss Fletcher, myself, and other American students, because under mother-right men are never founders of families or clans or totems. The evidence which I offered of the evolution of family or group totems from personal totems, gathered with much care and caution by personal investigation among the Salish tribes, is summarily dismissed because these tribes are no longer under matriarchy. And in like manner Miss Fletcher's conclusions based upon a close and sympathetic study of a Siouan people are set aside because the Omahas are under patriarchal rule. Whereas American tribal society abounds in data which show that, although group totemism did in all probability first appear in the admittedly earlier matriarchal state, it may and *does* arise under any and all conditions of savage society. The particular form which totemism in any given tribe shall take depends entirely upon the social structure of that tribe. Under matriarchal conditions the social unit is the clan, and under patriarchal rule the gens. These severally occupy the place which is taken by the family group in later social organization. The clan and the gens totem, then, clearly answer to the family totem of village society; or rather the latter answers to the two others and all arise in the same way. But whereas under the clan and gens organization the group-totem is necessarily confined to those social units, in village society with descent counted on both sides of the house it spreads outside of the family into the tribe at large or even beyond it; for here the factor of affinity is operating as well as that of consanguinity. The main difference, then, between the group-totem of village society and that of the earlier states of clan and gentile organization, lies in the fact that the totem-groups of matriarchy and patriarchy are formed, strictly, in theory at least, on consanguineous lines, while those of the village state include within them those connected by ties of affinity as well as those of blood."[1]

[1] We have been accustomed to regard the "village community" as the social unit of savages organized on the lines of the Salish peoples. Later and closer study of their social organization has led me to reject this view and regard the "family" as the real social unit. This family is composed of the elements of the other two more primitive states, the clan and gens, and

We have then a form of group-totemism for each stage of tribal society. Under mother-right with descent exclusively in the female line, we have what is commonly termed in this country "clan" totemism. Under father-right with descent exclusively in the male line, "gentile" totemism, and in village society, like that obtaining among the Salish tribes with descent on either or both sides of the house, we have still another form of group totemism, which for lack of a better term I will provisionally call "Kin" totemism. The *sqoiaqi* totem, already alluded to and described by me in my report to the Committee of the Ethnological Survey of Canada on the Halkomelem division of the Salish, is an illustration of this form. This totem is said to have originated in the adventure of some woman with some lake "spirits," and by her marriage and that of her descendants has spread over all the Halkomē'lem tribes, and its members are now numbered by hundreds. I can perceive no difference between this *sqoiaqi* brotherhood or kin-group and the clan groups of the northern Indians, except that in the latter case the group is theoretically composed of consanguineal relatives on one side of the house only, and in the former of the relatives on both sides of the house, affinitive ties being counted as well as consanguineous ones.

But to return to Mr. Lang's primary objection, that the evolution of the group totem cannot proceed from the personal, individual totem because in the more primitive forms of society where totemism originated "male ancestors do not found houses or clan names," descent being on the female side. As Mr. Lang has laid so much stress upon this argument and is able apart from it to appreciate the force of the evidence for the American point of view, if it can be clearly shown that his objection has no basis in fact, that his conception of the laws of inheritance under matriarchy is faulty, consistency must needs make him a convert to the American view. The singular error into which Mr. Lang has fallen is in overlooking the fact that *male* property and rights are as hereditable under mother-right as under father-right, the only difference being that in the latter case the transmission is *directly* from the father to his offspring, and in the former *indirectly* from the maternal uncle to his sister's children. What is there to prevent a man of ability under matriarchy from "founding a family," that is acquiring an individual totem which by his personal success and prosperity is looked upon as a *powerful helper* and therefore worthy of regard and reverence? Under mother-right the *head* of the clan, is invariably a *man,* the elder male

includes the relations of both parents usually for six generations. Every tribe is composed of a greater or less number of these families, just as the tribes where clan and gentile organization prevails are composed of a greater or less number of clans or gentes.

relative on the maternal side; and the clan name is not so much the property of the woman as of her elder brother or her conventional "father," that is her maternal uncle. The "fathers" of the group, that is the maternal uncles, are just as much the heads and "founders of houses" and clans in the matriarchal state as under the more advanced state of patriarchal rule. And that they *do* found family and group totems the evidence from our northern coast tribes makes clear beyond the shadow of a doubt.

The oft-quoted case of the Bear totem among the Tsimsheans is a case in point, and this is but one of scores that could be cited. The origin of this totem came about in the following manner: "A man was out hunting and met a black bear who took him to his home and taught him many useful things. After a lengthy stay with the bear the man returned home. All the people became afraid of him, he looked and acted so like a bear. Some one took him in hand and rubbed him with magic herbs and he became a man again. Thereafter whenever he went hunting his friend the bear helped him. He *built a house and painted the bear on the front of it and his sister made a dancing blanket, the design of which represented a bear. Thereafter the descendants of his sister used the bear for their crest and were known as the Bear clan.*"[1]

Who was the "founder of the family," here and the source of the clan totem? Clearly and indubitably the *man;* and so it invariably was as the study of the myths accounting for the clan totems plainly shows. It matters not, I may point out, that these myths may have been created since the formation of the clans to account for their origin, the point for us is that the *man* was regarded by the natives themselves as the "founder" of the family and clan. The founders of families and totem-crests are as invariably *men* under matriarchy as under patriarchy, the essential difference only between the two states in this regard being that under one the descent is through the "conventional father," under the other through the "real or ostensible father." Such being the case Mr. Lang's chief argument falls to the ground and the position taken by American students as to the origin of group-totems is as sound as before.

Having thus considered the American view of totemism and shown that the objections brought against certain features of it by Mr. Lang, and those who think with him, are groundless, we may now pass on to a consideration of the European view more particularly as set forth in recent publications in England.

Taking these in the order of time we have first to examine the view or rather views held by Dr. Frazer, the author of "Totemism."

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[1] Fifth Report on the Physical characteristics, etc., of the N.W. Tribes of Can., B.A.A.S., p. 24. London, 1889.

Writing in the *Fortnightly Review* for April and May of 1899, under the heading of "The origin of Totemism," he remarks: "It may be well to begin by reminding the reader that a totem is a class of natural phenomena or material objects—most commonly a species of animals or plants—between which and himself the savage believes that a certain intimate relation exists. The exact nature of the relation is not easy to ascertain; various explanations of it have been suggested, but none has yet won general acceptance.[1] Whatever it may be, it generally leads the savage to abstain from killing or eating his totem, if his totem happens to be a species of animals or plants. Further, the group of persons who are kin to any particular totem by this mysterious tie commonly bear the name of the totem, believe themselves to be of one blood and strictly refuse to sanction the marriage or cohabitation of members of the group with each other. This prohibition to marry within the group, is now generally called by the name of Exogamy. Thus totemism has commonly been treated as a primitive system, both of religion and of society. As a system of religion, it embraces the mystic union of the savages with his totem; as a system of society, it comprises the relations in which men and women of the same totem stand to each other, and to the members of other totemic groups. And corresponding to these two sides of the system are two rough-and-ready tests or canons of totemism; first, the rule that a man may not kill or eat his totem animal or plant; and second, the rule that he may not marry or cohabit with a woman of the same totem. Whether the two sides—the religious and the social—have always co-existed or are essentially independent, is a question which has been variously answered. Some writers—for example, Sir John Lubbock and Mr. Herbert Spencer, have held that totemism began as a system of society only, and that the superstitious regard for the totem developed later through a simple process of misunderstanding. Others, including J. F. McLennan and Robertson Smith, were of opinion that the religious reverence for the totem is original, and must, at least, have preceded the introduction of Exogamy."

Now, on examining this view of totemism, we perceive that it differs from that given by Major Powell in several important features. First, great stress is laid upon the fact that a totem is always one of a class of objects and never an individual object; and herein Dr. Frazer distinguishes between a "fetich" and a "totem." That this distinction is more fanciful than real we have seen; we may, therefore, set it aside at once as not being an essential element of totemism. And secondly

[1] These remarks I need hardly point out after what has been said respecting the unity of American opinion on totemism apply only to the European schools.

that totemism before it can be accepted as such, must bear upon it certain signs manual, in other words, must exhibit certain features of a prohibitory character which are regarded as its "Tests" or "Canons." These are:

1. The Canon of Exogamy.
2. The Canon of Taboo.

According to the first, no man shall marry or cohabit with a woman of his own totem group; and under the second, members of a totem shall abstain from killing or eating the totem object. Up to the publication of Messrs. Spencer and Gillen's important work on "*The Natives of Central Australia*,"[1] these canons were regarded by Dr. Frazer as the vital elements of totemism, *sine qua non*. Since his acquaintance, however, with the data therein presented, he has been led to look with different eyes upon these "canons," and now appears doubtful of their force and validity, and in their place seems desirous of establishing a new "test," which may be termed the Canon of Provinder.

As we shall presently have to refer to these "doubtful canons" in our consideration of Dr. Haddon's views, we need not stop to examine their validity here, but pass on to a consideration of the evidence upon which this later canon has been established.

It appears that among the Central Australian tribes they have a ceremony which they call *Intichiuma*, the object of which is "to provide the community with a supply of food and all other necessaries by means of certain magical ceremonies, the performance of which is distributed among the various totem groups." From this custom or ceremony Dr. Frazer has been led to infer that the main object of totemism among the Central Australian tribes, and, by implication, all other totemic peoples, is to ensure the multiplication of the animals or plants of the several totem species. For after dwelling upon the *Intichiuma* ceremonies he concludes thus: "Totemism among the Central Australian tribes appears, if we may judge by the *Intichiuma* ceremonies, to be an organized system of magic intended to procure for savage man a plentiful supply of all the natural objects whereof he stands in need. . . Have we not in these *Intichiuma* ceremonies the key to the original meaning and purpose of totemism among the Central Australian tribes, perhaps even of totemism in general."

In suggesting this new view of the matter Dr. Frazer seems to have abandoned the position he formerly took with regard to this question. In his earlier writings he suggested something quite different from this. Then it was the "soul-box" theory as it has been called. This

[1] Macmillan & Co., London, 1899.

view was based on the idea common in *Märchen* of an individual hiding his soul or spirit in some object or other, and thus forming a mysterious and intimate connection between himself and the object. "Here was the link," reasoned Dr. Frazer, "the relation between the individual and his tutelar spirit; here was the personal totem." This view had this much in common with the American view that it supposed the group totem to be a development from the personal totem, and here, at least, Dr. Frazer was on the right track. For to separate personal totemism from group totemism as many European students are doing, and regard them as unrelated phenomena savours it seems to me of anything but sound science. Dr. Frazer argued, and rightly we hold, that "the explanation which holds good of one kind of totem ought equally to hold good of the other"; and hence he drew the deduction that a clan or gens revered its totem and called itself after its name, because the members thereof were held to have their individual lives or souls bound up with that of their totem. The obvious objection, of course, to this explanation of totemism is, that this belief is found among so few savages who practise totemism. Dr. Frazer himself was conscious of this objection but explains it away after this manner. "How close" he argues, "must be the concealment, how impenetrable the reserve in which he," (the savage) "hides the inner keep and citadel of his being. No inducement that can be offered is likely to tempt him to imperil his soul by revealing its hiding place to a stranger." The answer to this is, that the close study of the American savage, who almost everywhere holds totem notions, by experienced students like Cushing, Dorsey, Fletcher, Powell and others, must have revealed some signs of its existence if it had formed a part of his philosophy of life or lay at the root of totemism. The question has been studied too long and too carefully for this belief, if it had ever been entertained, to have escaped discovery. For even if it had, conceivably, been everywhere systematically withheld by the natives from every white investigator who has ever gone among them, it must have been known to all Indians who held totemic notions. Yet, no Indian who has been weaned from the faith and practices of his fathers, or who has thrown off the old pagan habits and customs for those of civilized life, has ever told us a word about it. We have educated natives among us who are, equally with ourselves, keenly interested in the study of the customs and philosophy of their people, and it is not conceivable that they would know or learn nothing of such a belief, if it were the true basis and explanation of the totemism of their forefathers. This view, then, must have been set aside, even if its author had not discarded it, as he apparently has, on the ground that it is lacking in that feature which must necessarily

characterize any theory that claims to be regarded as the true explanation of totem habits and practices, viz., universal application.

We need not, then, further consider this theory, plausible as it certainly is, but return to Dr. Frazer's later hypothesis based on the Canon of Provinder. Let us now see what these *Intichiuma* ceremonies are and in what respect they differ from analogous ceremonies in this country.

According to Dr. Frazer and the authors of "*The Native Tribes of Central Australia,*" they are magic rites which have for their object the increase of the totem animal or plant. Each clan is regarded as possessing direct control over the animal or plant whose name it bears; and this control is exercised for the express purpose of increasing the necessaries of life.

Thus for example, "when men of the emu totem desire to multiply emus they set about it as follows: Several of the men open veins in their arms and allow the blood to stream on the ground till a patch about three yards square is saturated with it. When the blood is dry it forms a hard surface, on which the men of the totem paint in white, red, yellow and black, a design intended to represent various parts of the emu, such as the fat, of which the natives are very fond, the eggs in various stages of development, the intestines and the liver. Further, several men of the totem acting the part of ancestors of the emu clan, dress themselves up to resemble emus and imitate the movements and aimless gazing about of the bird; on their heads are fastened sacred sticks about four feet long and tipped with emu feathers, to represent the long neck and small head of the emu.

There is no need to cite further examples. The ceremonies of other clan-groups are all similar in character though they may differ in detail from that described. Now those familiar with the "rituals" of American tribes will see in these Australian ceremonies practices analogous to those found in this country. The elaborate Salmon ceremonies of the Pacific Coast tribes, for example, are parallel performances, and like the *Intichiuma*, are carried out expressly for the purpose of securing a good "run" of salmon. The wild rice ceremonies or rituals of the Menomini or wild-rice people, the Eskimo deer ceremonies, the maize or corn ceremonies, the rain and hunt rituals of the Sia and Zunis, all have the same object, the increase of the necessaries of life. That the several totem groups should perform the ceremonies connected with their own totem object is exactly what we ought to find under the view of totemism here taken. We find the same division of ritual and privilege among American tribes, though not everywhere so strongly developed and systematized perhaps as they are reported to be among the Central Australian peoples.

There the "division of labour" seems to have been specialized. This would appear to be the only distinction between them and the ceremonies or rituals of our American "medicine" or "religious" societies. In all other respect they appear to correspond.

Now, in this country we do not regard the practices of "medicine" or "magic" societies or totem groups, as the sum total of totemism, but only, as I have pointed out, as one feature of it, and that probably the latest in evolution; and the chief objection in my mind against regarding the *Intichiuma* and similar ceremonies as the basis "and original meaning and purpose of totemism," is that this explanation of it does not go to the root of the matter, but still leaves us to show how the several clans or groups acquired this magic or religious power over the totem object. In short, while it gives us a plausible *raison d'être* for totemism, it fails entirely to tell us how it originated, or why it is the totem group is commonly called by the name of the totem-object.

Moreover, totemism rightly considered is not a set of practices or ceremonies, but clearly a *belief*, which is the efficient cause of these practices. Hence to attempt to judge totemism by "canons" and "tests," is to regard the *form* or expression of the doctrine rather than the informing principle or concept which underlies and prompts it, to take the shell for the kernel, and to open the door to endless differences of opinion. For although the underlying principle of totemism is one and the same everywhere, its outward expressions or manifestations are as numerous almost as the tribes among whom it is found. The only possible way by which we can arrive at harmony of view in the matter is in the recognition of the psychic side or aspect of totemism as its really essential feature. When we have done this then we may profitably go on to study and examine the different local expressions of the doctrine and note the various forms they assume in the different stages of social evolution.

Dr. A. C. Haddon is the next exponent of totemism whose views we must consider. In his presidential address before the Anthropological section of the B. A. A. S. at the Belfast meeting of last year, he remarks: "Totemism as Dr. Frazer and as I understand it in its fully developed condition implies the division of a people into several totem kins.....each of which has one, or sometimes more than one, totem. The totem is usually a species of animal, sometimes a species of plant, occasionally a natural object or phenomenon very rarely a manufactured object. Totemism also involves the rule of exogamy, forbidding marriage within the kin, and necessitating inter-marriage between the kins. It is essentially connected with the matriarchal stage of culture (mother-right), though it passes over into the patriarchal stage (father-right). The totems are regarded as kinsfolk and protectors and benefactors of the kinsmen, who respect them and abstain from killing and eating

them. There is thus a recognition of mutual rights and obligations between the members of the kin and their totem. The totem is the crest or symbol of the kin.....To put the matter briefly, totemism consists of the following five elements:—

1. Social organization with totem kinsmen and totem symbols.
2. Reciprocal responsibilities between the kin and the totem.
3. Magical increase or repression of the totem by the kinsmen.[1]
4. Social duties of the kinsmen.
5. Myths of explanation.

Totemism is only one of several animal cults."

It is plain that we are here dealing with a view of totemism that has little or nothing in common with the American view. The key to Dr. Haddon's position lies in the tail of his definition. "Totemism," he affirms "is only *one* of several animal cults," and in accordance with this view he separates the various forms or local expressions of the totemic concept into distinct cults. He will have it that the personal and society totems are not features of "true" totemism at all. Such a position is, of course, incomprehensible to American students, yet this is the view he informs us of Tylor, Frazer, Lang, Hartland, Jevons, Durkheim and many other leading anthropologists.

Now, it will be instructive to see how this view originated. It apparently arose from a misconception of the real character and purpose of totemism as that doctrine is held and understood by primitive man himself. It appears to be founded upon the preconception of the savant rather than upon the real beliefs of the savage. Totemism has been regarded as a set or code of social rules and regulations rather than as the expression of man's earliest religious feelings and sentiment. It has been confused with certain social customs and observances which have in part grown out of the totem concept, and in part have arisen quite independently of it. This is clear from both Dr. Frazer's and Dr. Haddon's definitions of totemism and from the fact that "element" after "element" and "canon" after "canon" has had to be abandoned as fresh facts have been gleaned from primitive life, and the student has been led to approach the matter from the point of view of the savage. The newer data gathered from the Central Australian tribes by Messrs. Spencer and Gillen are so strongly confirmative of the American point of view that they compel the abandonment of the most important features or elements of totemism as it is commonly conceived by English students. This will manifest itself as we examine Dr. Haddon's elements in detail which we may now proceed to do.

First, as to "social organization with totem kinsmen and totem symbols." Dr. Haddon must pardon me if I point out that here at the

[1] Dr. Frazer's "Canon" of Provinder.

beginning his first element is based on an assumption which a close study of the subject makes it difficult to justify. It is assumed as an accepted and incontrovertible fact that the social organization of savage peoples into clan groups in the matriarchal stage has its foundation in totemism. But no proof has been, or can be, given for this statement and such evidence as we can gather on the point leads to the opposite conclusion. All we certainly know of the earlier stages of human society is that hordes or bands lived together under an organization which we call matriarchy or "mother-right;" that is kinship was traced through the mother only, the most obvious and the most certain form of relationship. Now, it is clear that the recognition of uterine ties must bind the mother to her offspring and them to her in closer bond than any other. Again, uterine brothers and sisters are a naturally defensive and co-operative group and spontaneously aid each other to avenge insults and redress wrongs. Here then, we probably have the pristine unit of social organization. But the mother of this "family" is also uterine sister to other sisters and brothers; therefore her "family" is connected by ties of blood to other "families." Now, the aggregation of these blood-related "families" constitutes a wider group, and this is the clan of matriarchy. Clans are confessedly blood-related groups, and this bond or union is everywhere seen to be based on this kinship of blood. The formation of clans, then, has nothing to do with totems, and it is not the common totem, which is inherited from the founder of the clan, that makes the members of the clan kinsmen. Clans, then, are purely social groups held together by the common tie of blood; and may, and most certainly do, exist as such, apart from any totem concept. The totem is obviously a later feature, and is in no sense an essential part of the clan structure. So much is this seen to be the case that Dr. F. Boas,[1] a most cautious and experienced investigator, has remarked that the earlier social grouping of the Haida and Tlingit appears to have been on lines similar to the communal organization of the more southern tribes, as the clans so frequently bear territorial names instead of totem names. Wemiaminow and Krause also noted that certain Tlingit clans were called after the localities where their communal houses stood. Indeed, it is a common practice with the Haida and Tlingit to call their clans after the names of their houses or the places where they are erected. And yet these tribes have a strictly matriarchal organization with group totems. It is not safe, then, to affirm that totemism implies the division of a people into *totem*-kins; the kinship is not totemic but always consanguineous. Totemism *per se* has nothing to do with clan structure.

Another feature of element No. I is the rule of exogamy. "Totemism," says Dr. Haddon, "involves the rule of exogamy, forbidding mar-

[1] See Fifth Report on N.W. Tribes of Canada, B.A.A.S., 1889.

riage within the kin and necessitating inter-marriage between the kins." But is this really a feature of totemism? It is true it has become in a measure associated with totemism, but is not this accidental? Is it not because the endogamous or incest group is the same thing as the clan group? We have seen that the formation of the clan group was independent of totemism, and are we not thereby justified in inferring that the endogamous group, which is the same body, was equally independent of totemic concepts? Such evidence as we may gather on the point certainly supports this view. Marriages among the tribes of America are universally regulated by customary law which appears to have had its origin quite apart from totemism. It appears to be based on political considerations rather than upon any other. Marriage ties were bonds employed to unite different clans into larger bodies such as the tribe. These bodies were primarily political corporations, their union having for its object a permanent alliance for offensive and defensive purposes. "Make ye marriages with us: give your daughters unto us and take our daughters unto you," said Hamor of old to Jacob, and we can well believe that many Hamors before and since have uttered the same words. Agreements or treaties of this kind enforced for a generation or two crystalize into customary law which later may be thought to have received the sanction of the clan or tribal deities and so to have become sacred. But is this totemism? I cannot think so. If the canon of exogamy were of totemic origin, surely we ought to find a uniformity of practice and observance. But this is by no means the case. American tribal society presents us with totem groups living under endogamous regulation and marrying strictly within the family or totem group. And the same thing is found in Australia.

Messrs. Spencer and Gillen have shown that among some of the Central Australian tribes, totemism has no effect upon marriage or descent, a man being free to marry a woman of his own totem or any other as he desires or thinks fit, and his offspring may belong to either his own or his wife's clan, or they may belong to neither, or part in one and part in another as fancy and circumstances shall dictate, and the traditions of these tribes "seem to point back to a time when a man always married a woman of his own totem. The reference to men and women of one totem always living together in groups would appear to be too frequent and explicit to admit of any other satisfactory explanation. We never meet with an instance of a man living with a woman who was not of his own totem."[1] "Such traditions," remarks Dr. Frazer in his consideration of Messrs. Spencer and Gillen's work, "it is plain, fly straight in the face of all our old notions of totemism. Are we, therefore, at liberty to reject them as baseless? Certainly not. Their very

[1] *The Native Tribes of Central Australia*, p. 419.

discordance with the practice of the natives at the present day is the best guarantee that they contain a substantial element of truth. They could not have been invented to explain customs which they contradict. Every theory of Central Australian totemism [and I may add of any other totemism] must reckon with them; none can be satisfactory which does not show how the gulf between the present and past totemic system of the natives may be bridged." [1]

In this view of the matter I entirely concur with Dr. Frazer, and would here desire to point out to him that the American view of totemism offers the most satisfactory of bridges and reconciles without violence of any kind, in the simplest and most effective manner this seemingly discordant feature of "Australian totemism."

Dr. Haddon has of course considered these disturbing data from Central Australia too; indeed, he has himself called attention to similar discordant practices among the Papuans and other Pacific Islanders. He remarks in this connection:—"Among some Papuans marriage restrictions are territorial and not totemic. Dr. Rivers has shown that in Murray Island, eastern tribe of Torres Straits, marriages are regulated by the places to which the natives belong. A man cannot marry a woman of his own village, or of certain other villages. . . . A similar custom occurs in the Mekeo district of British New Guinea, and it is probably still more widely distributed. I was informed by a member of the Yaraikanua tribe of Cape York, North Queensland, that children must take the 'land' or 'country' of their mother; all who belong to the same place are brothers and sisters, a wife must be taken from another 'country'; thus it appears their marriage restrictions are territorial and not totemic. The same is found amongst the Kurnai and the Coast Murring tribe of New South Wales. . At Kiwai, in the delta of the Fly River, B.N.G., all the members of a totemic group live together in a long house which is confined to that group. I have also collected evidence which proves there was a territorial grouping of totemic clans among the western tribe of Torres Straits."

But these practices, so discordant with the "Rule of Exogamy," do not affect Dr. Haddon in the same manner as they do Dr. Frazer. He still holds to his five "elements," and explains these breaches of his rule by regarding them as some of the steps by which the savage passes out of totemism.[2] In offering this suggestion Dr. Haddon seems to have overlooked the evidence of those traditions of the Arunta, gathered by Messrs. Spencer and Gillen, which shows that in *the early days of the tribe* "a man always married a woman of his own totem"; for it

[1] *Fortnightly Review*, 1899, p. 656.

[2] See his remarks on this head in his Address, page 14. Transactions of Section H., Brit. Assoc., Belfast, 1902.

does not appear to me to be susceptible of such an explanation as he has offered.

Regarding, then, the evidence on this head from America, from Australia and from Torres Straits, British Guinea and the other Pacific centres, offered by Dr. Haddon himself, it seems to me impossible to maintain that exogamy is a canon, rule, or essential element of totemism. The most that can be said for it is, that it is a fairly common concomitant of it, and that it appears to have received the sanction of the totemic deity. But this we can satisfactorily account for without regarding it as an essential part of totemism.

The common European view of exogamy seems to be the outcome of the theory of endogamy and exogamy first profounded by McLennan. For following him others of the earlier writers on marriage customs in tribal society, "culled from the literature of travels a vast body of stories about taboos in marriage; and it was finally concluded that certain tribes required their tribesmen to marry women who were foreigners and aliens. This was called exogamy. Then it was held that other tribes required or permitted their tribesmen to take wives within the tribe; and this was called endogamy. So an attempt was made to classify the tribes of mankind, not only in America but elsewhere, into two groups, the exogamous and the endogamous.

Now we understand that in all tribal society there is an endogamous, or incest, group, which we call the clan in savagery and the gens in barbarism; while, at the same time, the clansmen usually marry within the tribe *by regulations which vary greatly from people to people.* It seems that the ties of marriage are used to bind different peoples together in one larger group which we call the tribe, and that the clans of a tribe may at one time have been distinct tribes; that when tribes become weak or desire to form permanent alliances with other tribes for offensive and defensive purposes, such tribes agree to become clans of a united body and by treaty confirm the bargain, by pledging not to marry within their own groups, but to exchange women with one another. . . . Such a bargain or treaty enforced for many generations as customary law, ultimately becomes sacred and marriage within the group is incest. Perhaps there is no people, tribal or national, which has not an incest group; so all peoples are endogamous as all peoples are necessarily exogamous."[1]

Such were the views held and expressed by Major Powell regarding the origin of endogamous and exogamous regulations, and in default of a better may well be accepted as the explanation most in harmony with the facts of the case.

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[1] Sociology, or the Science of Institutions, W. J. Powell. Amer. Anthrop., pp. 703-4, N.S., I, 1899.

Second. "Reciprocal responsibilities between the kin and the totem"—in other words "the totems are regarded as kinsfolk and protectors, or benefactors of the kinsmen who respect them and abstain from killing and eating them." Here, Dr. Haddon is in some respects on safer ground. The totems are naturally, for obvious reasons, treated with respect and regarded as the "protectors" or "benefactors" of the individual and the totem group. But when he claims that they are commonly regarded as kinsfolk, using that term in its ordinary sense, and that the kinsmen refrain from killing and eating them, we have again what appears more like an over-hasty generalization of the savant rather than the actual belief and practices of the savage, and Dr. Haddon will find it extremely difficult to maintain this view in face of the array of opposing evidence which later ethnological research furnishes on this head. This is so strong, that from a consideration of a portion of it from one source alone—the Central Australian—Dr. Frazer has been led to set aside his Canon of Taboo and regard this rule of abstention as having no important bearing upon totemism, or at most to be only a later subsidiary feature of it. The traditions of the Arunta represent their ancestors as possessing and freely exercising the right to kill and eat their totem animals and plants, "as if this were indeed a functional necessity."[1] And American data fully bear out the truth and reliability of these traditions. Yet, Dr. Haddon makes no reference to these discordances with his "elements" in his address, nor does his theory of totemism attempt to explain them, which, as Dr. Frazer has observed, every theory of totemism is bound to do.

The study of this question of taboo from the point of view of American evidence, has led me to the conclusion that the practice of abstaining from killing and eating the totem object, when an edible one, arises *in part only* from the supposed relation existing between the totem and the possessor or possessors of it. It is seen to be mainly the outcome of the animistic philosophy of savage man and his belief regarding the animal and vegetal world. Among all American tribes, no matter what their social structure may be—clan, gens, or village community, we find numerous and curious rules and regulations and taboos regarding the slaying, gathering and eating of animals and plants, which are quite independent of totemism, the explanation of which becomes measurably clear to us, when we bear in mind the universal attitude of savage man towards the universe, as we have seen it revealed to us by Cushing and other sympathetic students of primitive life.

The origin of these food taboos and restrictions arises primarily from the savage's strong belief in the "mysterious" powers of animals and plants; and the practice of them was originally, whatever it may

[1] *The Natives Tribes of Central Australia*, p. 209.

have been later, intended to propitiate them. This is clear from the study of the subject. Among the Thompson Indians of British Columbia, a tribe where group-totemism of any kind seems to be wholly unknown, we find numerous taboos relating to the killing and eating of animals and plants which differ in no essential from the so-called taboos of totemism. For example, when a lad killed his first deer he never ate it himself but always gave it to the people to eat. When a hunter killed a deer it was said the rest of the deer would be well pleased if the hunter butchered the animal nicely and cleanly. To waste the meat of a deer displeased the animals who would not in consequence allow themselves thereafter to be shot by the hunter. If a hunter was overburdened and had to leave behind some of the meat of the deer, it was said that the deer were better pleased to have the meat of their fellow hung up in a tree rather than left on the ground. The intestines of the quarry which in some cases were not taken away by the hunter were collected and placed where the blood had been spilt while butchering. The whole was then covered with a few fir boughs, the hunter in the meantime bidding the deer not to be sorry at the death of their companion or because some portion of its body had been left behind, since he had done his best to cover it up. If the hunter neglected to cover the remains it was believed that the rest of the deer would feel sorry or angry and would cause him bad luck in hunting. If a deer-hunting party had bad luck they remained at their camp for a few days, sweat-bathing, singing and praying to their guardian spirit to give them success and also asking the deer to present themselves to be shot at. No hunter would give a deer's head to, nor would he eat with, a man who was the first or second born of a family. The deer, it was believed, would become very wild and difficult to shoot, if he did so. Deer meat was never taken in through the common door or entrance of a lodge because the common door was used by women. When the father of an adolescent girl began to hunt the deer always ran away from him. A bear hunter often addressed the prey and begged it to come and be shot at. The grizzly bear was asked not to be angry with the hunter nor to fight him, but rather to take pity upon him and deliver himself up to him. When a man killed a bear he and his companions with him painted their faces and sang the bear song. Sometimes he prayed also thanking the bear for letting himself be killed. When the flesh of the bear's head had been eaten the skull was tied to a small tree top and left there. If this were neglected the bears would take offence. Placing the heads of any large animal on trees or rocks was a mark of respect. A hunter never talked lightly or made fun of any animal he intended to hunt or trap. He always spoke of it in respectful tones and said,

"I may kill it," never, "I shall kill it." All young people when eating the first berries, roots or other products of the earth addressed a prayer to the Sunflower-Root, thus:—"I inform thee that I intend to eat thee. Mayest thou always help me to ascend, so that I may always be able to reach the tops of mountains and may I never be clumsy! I ask this from thee, O Sunflower-Root. Thou art the greatest of all in mystery."[1] These examples might be supplemented by scores of others from other American tribes. The taboos and restriction in food imposed upon menstruating women, upon widows, widowers and orphans, all belong to the same class and have a similar significance. The First Fruits ceremonies of the Fraser River tribes, the many customs connected with the salmon all show the same beliefs in the mysterious powers of animals and plants; and the various restrictions or taboos all have the same object—the propitiation of the spirits or ghosts of the animals or plants.

It is not in totemism *qua* totemism, then, that we should look for the explanation of taboos of this kind, but in the savage's general animistic conceptions of nature. They are the natural outgrowth of his anthropopathic apprehension of things, and are only incidentally connected with totemism.

With regard to the claims of kinship between the totem and the totem-group, Dr. Haddon seems to overlook entirely the large body of contrary evidence on this head gathered by Dr. Boas from the Northwest tribes and by other students elsewhere. I do not see how any one familiar with the later American evidence in this connection can hold that the totem object is commonly regarded by the totem-group as the ancestor and founder of their clan. I know this was the earlier view even of American students, but this has been generally modified by later and wider research. It is true the totems are usually addressed by the natives themselves as "grandfather" or "grandmother," but these terms, as most students are aware, among primitive races are more terms of respect than terms of relationship. When an Indian wishes to show regard to a person or an animal he always addresses him by a title indicative of superior age, such as elder brother, uncle, father, grandfather or the like. This custom I suspect, before it was properly understood, had a great deal to do with misleading unwary students, and possibly even the savages themselves, at times, into thinking that the totem object was the ancestor and founder of the clan or gens. The true relation between the totem object and the totem-group will be invariably found to be the same as that existing between the individual and his personal totem—a relation of "mystery" not of blood. I

[1] The Thompson Indians of B.C., by J. Tait. Memoirs of the Amer. Mus. of Nat. Hist., Vol. II, p. 346, *et seq.*

have already shown that the taking or assuming the name of a totem or tutelary spirit implies relationship with it, but not that of ancestor and descendant.

Third. Magical increase or repression of the token by the kinsmen. This is an element added to totemism since the publication of Messrs. Spencer and Gillen's researches among the Central Tribes of Australia. It has reference to the *Intichiuma* ceremonies, the same that led Dr. Frazer to discard his "canons" of exogamy and taboo. We have seen that these ceremonies are peculiar to "religious" or "medicine" societies in America and constitute but a single aspect of totemism. They are not a feature of clan or gentile totemism at all from the American point of view, but like the taboos and restrictions we have just considered are the natural outcome of savage philosophy. Major Powell has given a very lucid description of them in his paper on Sociology, which as it bears directly upon Dr. Haddon's third "element" I shall take the liberty of citing in part here. He remarks:—In savagery there are societies which are organized for the purpose of securing the co-operation of ghosts in the affairs of mankind. These societies are often called phratries or brotherhoods, and are the custodians of the lore of unseen beings. They occupy themselves with ceremonies and various practices intended to secure advantages and to avert evils which are attributed to multitudinous ghostly beings which are supposed to have tenuous bodies and to live an occult and magical life as they take part in human affairs. Everything unexplained is attributed to ghosts. . . . .These phratries, which are organized to obtain the assistance of ghosts, develop periodical ceremonies which are designed to secure the annual productions of nature upon which human welfare depends. Thus the fishing tribes of the Pacific Coast that depend largely for their food on the coming of the salmon from the sea at stated times, have ceremonies designed to secure their coming; those that depend upon cereals, like wild rice, also have their ceremonies to invoke the aid of ghosts to bring abundant seed. In arid lands, where vegetation is so dependent upon rain, these ceremonies take the form of invocations for rain. Thus in every region of the United States periodical ceremonies are performed to secure harvests and supplies of game.[1]

It will be seen from these citations that these ceremonies are no part of clan totemism among American savages; and with all due respect to Australian students it is open to question whether the Intichiuma ceremonies are not best explained, as Major Powell held, by regarding them as observances of "religious," "medicine" or "magical"

[1] *Sociology, or the Science of Institutions.* Amer. Anth., N.S., I, 1899, pp. 710-1.

societies or brotherhoods rather than as observances, or ceremonies performed by the whole clans.

Fourth. Social duties of the kinsmen, that is to say the kinsman looks to his brother kinsmen for sympathy and assistance in trouble or need. Here again I am constrained to ask: "Is this totemism?" As I have shown, the clan is a blood-connected group, and its members naturally and spontaneously aid and help one another. Their very connection prompts and suggests this. It is a world-wide universal practice, and I cannot see that totemism has anything to do with it. We find exactly the same custom prevailing among the "families" of the Salish and other tribes whose organization is neither clannish, gentile nor totemic. Surely this "element" has the least right of any to be considered an essential feature of totemism.

Fifth. Myths of explanation. Here again I fail to see why this should be regarded as an "element" of totemism, when that which is much more characteristic of that doctrine—personal and society totems —are rigidly excluded in Dr. Haddon's definition. It is true most peoples have myths explaining or accounting for the origin of their totems, but I marvel that Dr. Haddon should claim these among his elements as they so invariably show that the group or clan totem was originally a personal or individual totem of the founder of the clan, a form or feature of totemism he deliberately rejects. Moreover, myths of explanation are not peculiar to totemism, they run through the whole body of tribal habits, customs and beliefs, and the myths explaining the origin of totems differ in no essential from the myths explaining the origin of the tribe or cosmos.

Thus, it is clear, there is little of totemism, when it is rightly regarded, in Dr. Haddon's five "elements"; from which it is seen that he has considered the social accessories and later accidents of totemism rather than the psychic content of the doctrine itself. That he, and those who hold like views with him, are justified in their position by the facts of the case, I cannot persuade myself, nor do I see that we arrive at any better understanding of the matter by setting up a form of so-called "true" or "typical" totemism,—which appears to me to be fashioned more after the preconceived ideas of a cultivated European than after the ideas of an American or Australian savage,—than by seeking to comprehend the principle or concept that lies at the base of the doctrine. To my mind, the apprehension of the efficient cause of totemism leads to a better understanding of the doctrine in all its manifestations than any vision of totemism in its "fully developed condition," and I submit that we may derive more profit from our consideration of the subject when all "animal cults" are considered as only so many local phases or expressions of one and the same fundamental concept, as they de-

monstrably are, rather than as different and distinct cults, as Dr. Haddon would have us regard them. To separate individual totemism from group or "typical" totemism seems to me to cut ourselves off from the very heart and root of the matter, from the only evidence that can possibly help us to understand the purpose and meaning of totemism. It is like asking the student of chemistry to be satisfied with his compounds and not seek to discover the elements that lie at their base.

As Dr. Haddon has informed us in his address that his view of totemism is that "understood by Tylor, Frazer, Lang, Hartland, Jevons, Durkheim and others," it becomes unnecessary to criticize the views of these gentlemen. We may at once pass on to examine the "suggestion concerning the origin of totemism" put forward by Dr. Haddon in the latter part of his address, and also the "guess" of Mr. Andrew Lang concerning "the origin of totem names and beliefs."[1] This "suggestion" of Dr. Haddon does not so much deal with the origin of totemism as I and other American students understand that doctrine, as with the origin of totem-group names. Thus, he remarks: "I take this opportunity to hazard a suggestion for a possible origin of one aspect of totemism. Primitive human groups, judging from analogy could never have been large, and the individuals comprising each group must have been closely related. In favourable areas each group would have a tendency to occupy a restricted range owing to the disagreeable results which arose from encroaching on the territory over which another group wandered. Thus it would inevitably come about that a certain animal or plant, or group of animals or plants would be more abundant in the territory of one group than in that of another. To take a clear example, the shore-folk and the river-folk would live mainly on different food from each other, and both would have other specialties than fell to the lot of the jungle-folk. The groups that lived on the seashore would doubtless have some natural vegetable product to supplement their animal diet, but the supply would probably be limited alike in quantity and variety. Even they would scarcely have unlimited range of a shore line and there would be one group of shore-folk that had a specialty in crabs, another would have shad-beds, while a third would own sandy shores which were frequented by turtles. A similar natural grouping would occur among the jungle-folk: sago flourishes in swampy land, certain animals frequent grassy plains, others inhabit the dense scrub, bamboos grow in one locality, various kinds of fruit trees thrive best in different soils; the coastal plains, the foot hills, the mountains, each has its characteristic flora and fauna. There is thus no difficulty in accounting for numerous small human groups, each of which would be largely dependent upon a distinctive food supply, the

[1] *Folk-Lore*, Vol. XIII, No. 4, December 25th, 1902.

superfluity of which could be bartered for the superfluities of other groups . . . . Among the shore-folk the group that lived mainly on crabs and occasionally traded in crabs might well be spoken of as "crab men" by all groups with whom they came in direct or indirect contact. The same would hold good for the group that dealt in clams or in turtles, and reciprocally there might be sago-men, bamboo-men, and so forth. It is obvious that men who persistently collected or hunted a particular group of animals would understand the habits of these animals better than other people, and a personal regard for these animals would naturally arise. Thus, from the very beginning, there would be a distinct relationship between a group of individuals and a group of animals or plants, relationship that primitively was based, not on even the most elementary of psychic concepts, but on the most deeply seated and urgent of human claims, hunger."

The point that strikes one first in this suggestion is that it knocks all to pieces the "Canon of Taboo," which is included in Dr. Haddon's second "element." Dr. Haddon is, of course, aware of this and explains it away by remarking that his suggestion "deals with incipient totemism" only. This again is, of course, an incomprehensible position from the American point of view, but it serves admirably to show that English students regard the social concomitants of totemism as its essential features—a view, as I have shown, impossible to hold if we would rightly understand this phenomenon of savage life.

Now the objections that arise in my mind as I consider this hypothesis are several and some of them deep-rooted.

First, these names come from *without;* they are not taken or assumed by the groups themselves, but are applied to them by the neighbouring groups. And while we have numerous instances of nick-names being given both to individuals and tribes by their neighbours, I can recall no instance where these names have been recognized and adopted by the individuals or groups thus named. Endless tribes and division of this country have had names descriptive of their habitat, the food upon which they chiefly live, their mental or physical characteristics, etc., bestowed upon them; but in no case that I can discover have those names been recognized or adopted by the people themselves; and to apply these names to them to their faces is to deeply insult them and wound their self-respect.

Secondly. If this were the true origin of group names we ought to find ample evidence of it in the names themselves. Now, a study of clan names as they obtain in America gives little support to Dr. Haddon's theory. For while they are generally called after the names of the objects of the *present* environment of the clan or group or tribe, (and this is a highly significant fact which has been too much overlooked in our

considerations of the subject), these objects are by no means commonly, such as are suitable for food, and Dr. Haddon's explanation of these does not appear satisfactory to me.

Thirdly. As I have just pointed out, the names of totem groups are invariably found to be the names of the objects that are natural to the locality where the clan groups reside. Now we know from historical data, to say nothing of the tradition of the natives themselves, that a very general displacement of tribes has taken place all over the American continent, and this within comparatively recent times; yet in every case, I believe I am right in saying, the totem names of both *individuals* and *groups* are names of objects characteristic of their present environment, many of which in numerous instances must have been quite unknown in the earlier habitat. What, then, is the legitimate conclusion deducible from these facts? Is it not that the names of some clan groups, at least, are comparatively modern and date at earliest from the first presence of the clan in its present territories? This does not agree with Dr. Haddon's hypothesis which expressly supposes the totem names to have arisen in the earlier days of man's history, when he dwelt in small, more or less, isolated groups in restricted areas. But it appears to me to support strongly the view I have advocated, that totem groups and new clans may arise at any time in the history of tribal society, and that the personal totem gives rise to the group totem. Tribes as a general rule increase in number, with the lapse of time and new clans spring into existence, after the manner of the Bear clan of the Tsimshian. How else are we to account for the presence of totem-group names which have clearly arisen since the settlement of the tribe in its present quarters, as they are called by the names of objects known and common to their present, but not to their former place of residence. But these objections, strong as they are, I regard as comparatively minor. My chief and invincible objection lies in the total disregard of this hypothesis for the *psychic* factors of totemism, which my study of the question has compelled me to look upon as all-important and essential to the doctrine. I fail entirely to see how the evidence brought together by American and other students regarding savage man's mental attitude towards the universe can be set aside or neglected in any discussion of totemism. Life and nature are full of mystery to the savage from his birth to his death, but Dr. Haddon's theory wholly overlooks and ignores this and bases the origin of a doctrine which is confessedly full of "mystery" upon the common-place, unmysterious feeling of hunger. Again, I must be pardoned if my personal knowledge of the workings of the primitive mind prompts me to say this is more the view of a cultivated European than that of a superstitious savage. It is altogether too matter-of-fact for the mind of primitive man, who sees in the commonest and simplest

object before and about him an incomprehensible and awe-compelling mystery. Totemism was born and cradled in the savage's ever-present sense of mystery, whatever it may have since become, and any hypothesis which ignores this feature of savage life must necessarily fail in its purpose. In this all students of primitive philosophy will assuredly agree.

The objections I have urged against Dr. Haddon's "suggestion," apply with equal or greater force to the "guess" of Mr. Lang, the main feature of which is, that the names are always given "*from without.*" Mr. Lang's line of argument is as follows:—"At first the human groups were 'anonymous,' that is bore no special designations. Every group would speak of itself as 'the men,' while it would know neighbouring groups as 'the others.' But this arrangement lacks distinctness. Each group would need a special name for each of the neighbouring tribes." Mr. Lang does not mind how the name arises. It may be given in derision, or it may be based on some fancied or real group-traits of character, good or bad, or applied from any cause whatever, provided only that it come "*from without.*" This is the vital point of his theory. The main support Mr. Lang offers for this view, is gathered from the practices of modern English and continental villagers. I have to admit that he gives us much interesting information regarding the names of derision applied by the people of one village to those of another, but he fails entirely, as far as I have been able to see, to show us that these villagers called *themselves* by these terms, or recognized or admitted them in any way. I was myself born and bred in the west country and my recollection of these nicknames is that the boys of one village would fight with the boys of another just because they cast these names in each other's teeth. Mr. Lang gives us a lengthy list of these village names, of which the following are examples:—

Ashley	Monkeys.
Yarby	Geese.
Watworth	Bulldogs.
Fenton	Rooks.
Wickley	Tigers.
Oakditch	Potato-grubs.
St. Aldate's	Fools.
Hillborough	Mice.
Miltown	Mules (formerly "rats")
Loughton	Cuckoos.

But will Mr. Lang assure us that these villagers called themselves by these names, or admitted them as applicable to them for a moment? I think he will find that they are invariably indignantly repudiated by one and all. Mr. Lang cites the term "Eskimo" as another example,

and remarks that this name was applied to the Arctic races in America by the neighbouring Indians; but Mr. Lang should surely be aware that no Eskimo native ever calls himself, or rather speaks of himself by this term, but always by his own name of Inuit or its equivalent. I could cite scores of cases of names applied by one Indian tribe to another, but I know of no single instance where those tribes have ever adopted and assumed them, and the only evidence Mr. Lang himself offers that any of those sobriquets "stick" and become recognized and adopted by the people to whom they are applied, is that drawn from the practice of schoolboys of the present day. He remarks: "Each group would, I suggest, evolve animal and vegetable nicknames for each neighbouring group. Finally some names would 'stick,' would be stereotyped, and each group would answer to its nickname just as Pussy Moncrief, or Bull-dog Irving or Piggy Fraser or Cow Maitland does at school."[1] But even accepting this kind of evidence seriously, Mr. Lang forgets that the cases are not parallel. The schoolboy cannot help himself; when his seniors or his physical superiors address him by his nickname, he *has* to answer to it or be kicked; but does the youth pride himself on his nickname and desire that he shall be known in the family circle by it, and thereafter retain it? Mr. Lang will pardon me if I say that to my mind his hypothesis is truly a "guess" and nothing more. I am bound to remind him, too, that he found fault with the evidence Miss Fletcher, I, and other American students offered for the origin of group-totems taken from savage tribes immeasurably nearer to the primitive condition of mankind than his European villagers and Scotch schoolboys, and rejected it on the ground that these tribes had passed beyond the matriarchal state. What shall be said then for his main evidence, which is drawn from modern English and French villages and from schoolboys life? Mr. Lang may claim that he has offered evidence from American tribes under patriarchy, from the same stock, indeed, from which Miss Fletcher drew her evidence. But even granting the validity of this evidence, or rather Mr. Lang's interpretation of it, which I am unable to do, as it appears to me to be founded upon a misconception, why, I would ask, should Mr Lang desire to refer to the customs of the Siouan tribes in support of his theory, and preclude Miss Fletcher or others from doing the same? Of the two classes of evidence, the superior cogency of that of Miss Fletcher must be apparent to anybody.

Now I submit, in conclusion, that the view of totemism here advocated suggests at the same time an origin for totem group-names that does no violence to the modes of savage thought and reasoning, and

[1] The origin of Totem Names and Beliefs. Trans. Folk-Lore, Vol. VIII, No. 4, 1902, p. 386.

which is strictly in harmony with all lines of evidence upon the point, and may well be regarded as the true origin. We have seen that names mean vastly more to the savage than to ourselves. A name with him, as I have shown, is a "mystery" thing, not a mere mark or label; and he who assumes or takes the name of a thing, animate or inanimate, animal, plant, object or element, is thought to partake of the nature of the spirit of that object, and to be bound to, or connected with, it in a very special and mysterious manner. As Miss Fletcher has shown, the personal totem name indicates the protecting presence of a deity or tutelar spirit and close connection with it; and as the attitude, as we have seen, of the member of a group towards the common totem is always the same as that of the individual to his totem, it may justly be inferred that the relation is the same and arose in like manner; and that the group name is the totem name of the ancestor who founded the family, group, or clan, and transmitted the totem or protecting presence and powers of the tutelar spirit. The character of the group-totem is everywhere seen to be the same as that of the personal totem, therefore, the explanation of the one may justly be regarded as the explanation of the other, more particularly, as I have shown that the personal totem undoubtedly *does* give rise to the family and group-totem.

If Dr. Haddon, Mr. Lang and other European anthropologists will study the nature and significance of *nomenology* as it is found among American tribesmen, I am fain to believe they will be led to take the views here advocated. It may be observed that it is no argument to urge that names are not regarded by savages in other countries as they are by the American tribesmen, for we are not at all certain that they are not, and the probability is that they are. Other savage races have not received the same close study as those of this continent, and it was not till students had spent many years of investigation among the American Indians, that they began to understand and perceive the deep significance names had for them.

I desire finally to say that I have been prompted to the writing of this paper by the desire to assist European students of totemism to understand better the view commonly held by American students; for I think it is clear from the criticisms upon Major Powell's article in *Man*,[1] that the evidence upon which that view is founded has not been

[1] The purport of this article has been somewhat misunderstood. It was never intended as a deliberate presentation of the views taken of totemism in America, but was written in consequence of, and immediately after, the appearance of Dr. Frazer's article on the discordant data from Australia in the Fortnightly Review for April and May, 1899, although not published till last year in *Man*, and should be read in the light of that article. Its intention was rather to show that when totemism is rightly regarded as a system of

duly appreciated by European anthropologists, nor received the consideration at their hands that it merits. Perhaps I am presumptuous in undertaking the task; but if a decade's contact with savage races and a close study of their habits, customs and modes of thought be any qualification for the undertaking, I may, at least, claim that.

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naming, in the sense in which the savage regards names, and not as a system of social rules and regulations, as held by most European students, the data from Australian and other sources which compelled the majority of European anthropologists to reconsider their position, fall naturally into place in the American conception of things, and cause no embarrassment to the American student whatever; and in this, as I have tried to show, he was quite right.

VII.—*A few remarks on "The Siege of Quebec" and the Battle of the Plains of Abraham, by A. Doughty, in collaboration with G. W. Parmelee; and on the Probable Site of the Battle of the Plains of Abraham, by A. Doughty.*

By P. B. CASGRAIN,

(Communicated by B. Sulte and read May 19th, 1903.)

Amidst the well deserved encomiums which have welcomed the recent publication of the above remarkable work on the Siege of Quebec, we have much pleasure to join in a cordial approbation.

All students of Canadian history and, we may add, the English speaking people of the whole British Empire, ought to be thankful to the authors and to Mr. Doughty, in particular, for his diligent and successful researches, his arduous and unremitting labours, his skill and tact in finding and obtaining through high protection and influential recommendations, ready access to many valuable documents deposited in public archives abroad, and in various private collections. He may also be congratulated, jointly with the editors, on the magnificent form in which he has been able to extend them to the literary world.

The additional papers now published will throw further light on many details and incidents of the most important events which resulted in the conquest of "*La Nouvelle-France,*" and secured against her the supremacy of England in the New World.

The beautiful interesting six volumes now before us deserve more than the cursory notices generally extended to new publications, with more or less appreciative truth or commendable sagacity and critical ability. They require a full and complete review by a learned and competent authority, and we frankly admit our incapacity to do so with adequate justice either to the authors or to the reader and public at large. Therefore we earnestly invite our learned men and scholars to a fair and sound critical examination of the whole subject which is not yet exhausted as we shall see.

They will thereby continue the praiseworthy and successful efforts of the authors to promote and perfect the knowledge of this eventful period.

Their primary object, after a careful scrutiny of the new documents brought to light, would be to ascertain whether they are, as we have heard it alleged, subversive of our former acquired notions on the subject, and in what particulars; or whether they do not generally confirm the lessons we have learned from the historians of the past.

By passing through an impartial and judicious ordeal and scrutinizing with a severe test the import and value of the divers documents and plans brought forth, and carefully comparing, analyzing and weighing what appears to be conflicting evidence, we may reasonably expect to definitely settle what little remains of difficult, obscure or doubtful points and debatable ground respecting this grand historic achievement.

In the meantime we may be allowed to venture a few remarks on some particular data on which we happen to differ, as presented to us by Mr. Doughty and his collaborators; and we anticipate they shall not be constructed amiss. For be it well understood we have not the least idea of disparaging the value of the scholarly and elaborate production of the authors in its general embodiment, but it would be undignified and unmanly on our part, if by reason of the consensus of approval and praise we have seen and heard, we were to be thereby silenced, and deterred from expressing our views when occasions arise for a reasonable criticism, based upon the very documents we have the opportunity of perusing for the first time.

If, therefore, we should meet in the course of the narrative what may appear to us inaccurate, erroneous, or contradictory assertions or incomplete statements; one-sided appreciations, deductions and conclusions more or less venturesome; discrepancies and disagreements between the collaborators themselves, or between the proof and the suppositive or inventive process of the writers,—then we are bound to point them out for the sake of historical accuracy; however supported they are by much display of learning, great skill, and nice ingenuity of exposition; and we feel the more obliged to expose them because they are often rendered attractive by an agreeable style, presented in a handsome and appropriate garb, and adorned with artistic illustrations, all which tend to prepossess, even captivate the superficial or unwary reader.

In pursuing, for the present, a limited investigation and confining it to two principal points, we shall endeavour to carry it with due caution and discrimination, avoiding acrid or unnecessary disputations or petty criticisms. A temperate discussion, supported by well grounded considerations, tends more to display the literary value of the work and the attainments of Mr. Doughty personally. This course is rather complimentary than otherwise.

We may premise by submitting that although we acknowledge the head author of this extensive publication to be a persevering and fortunate collector of precious historical documents, yet we cannot refrain from expressing our matured opinion that he and his contributors have not always shown a strong and sure grasp in handling them, and have been misled into some avoidable errors.

For it looks most strange that with all the former known materials in hand and the accretion of the present documentary information received and at his early disposal, Mr. Doughty, in first instance and by his paper, should have woefully failed to arrive at a true and correct conclusion on the main object of his contention, as to the battle of the Plains of Abraham, that is to say, the real position of the armies when ready to engage; and should have produced in support thereof a plan of the battle such as *his* Plan A, by him affirmed, *bonâ fide,* to be then perfectly accurate.

And what is more surprising is to see his collaborators, specially Mr. Chambers [1] having remained so long "*blind*" over palpable errors, apparent to the naked eye on this Plan A.

This arraignment, improbable as it may seem at first, is nevertheless but too well grounded.

It needs no further proof than the preliminary one drawn from the own showing of the four joint collaborators. For without disclaiming or in any way discarding the first plan and finding of Mr. Doughty, upon whose faith they assumed both to be accurate and trustworthy, but, on the contrary extolling them as entirely reliable and conclusive, they now come out with a very different version and a totally changed plan of battle.

This, of course, is a tacit but an unavoidable admission of the previous mistake; which it would have been more proper to candidly acknowledge, as soon as it was perceived by them, particularly when they could not help seeing the utterly false position given to both armies, since their attention was called to it by an article in the *Quebec Morning Chronicle,* August 4th, 1900.

Otherwise, if these writers allow both plans and respective versions to subsist on the same footing and be reputed as equally true and correct, the reader will remain at a loss to make a choice as to the one to be relied on; or may be inclined *a priori* to reject both as antagonistic, because they are drawn from the same materials and sources.

Under the modest title "The Probable Site of the Battle of the Plains of Abraham," Mr. Doughty has determined positively this exact site according to his conception of it in 1899.

In view of elucidating the two main objects and ultimate conclusions of his paper, that is to say: first, the disposition of the contending armies in battle array on the field, and secondly the complete elimination of the Race-course as part of that field, he has marshalled his evidence and arguments with such seductive ingenuity and consummate skill as to

[1] Cf. *Quebec Morning Chronicle,* April 2nd, 1900. *Mr. Doughty's able contribution on the subject*; also *id.,* May 3, 1903. *North American Notes and Queries,* June, 1900, and August, 1900.

present *a primâ facie* apparently clear case and satisfactory as such even to many learned readers; until a closer examination revealed the total fallacy of the whole fabric and mode of exposition.

In the meantime it was headlong asserted in the press by a correspondent, more bombastic in tone than perspicuous in discernment, that "he (Mr. Doughty), is absolutely satisfied that his conclu-"sions are buttressed by truth and cannot be assailed."[1]

Certainly there is much that is plausible in the argumentation of the writer, and though we disagree with his solution on both points adverted to, his paper is singularly interesting to study, and deserved a better result, instead of being now discarded by him and meeting a disastrous failure as to the position of both armies, compared to which the small blunders he found in Hawkins are insignificant.

The connection of this paper with the more complete work which is its legitimate and grown up offspring, is so close and direct that, for the sake of argument and comparison, they must be reviewed together and placed in juxtaposition.

It would be more satisfactory to us not to refer, in any way, to that paper, if we could pass over several material errors we see in it, and specially in the plan A, as mere oversights or inadvertences, had not Mr. Doughty since reaffirmed in a deliberate manner their perfect truth and accuracy, being confirmed, as he alleges, by the further plans he had since received from Europe.

And were it not also that the insertion of the same paper in the transactions of the Royal Society of Canada, was hastily put in before having been examined and discussed by the section; as explained by the Editor, who at first sight judged it "a paper of special value and must assist the student in coming to a correct conclusion." There it remains unchallenged, though admitted now to be erroneous.

We are sorry to say we cannot fully commend the second version and plan, as being also correct, because the same course of reasoning has been partly followed; and they must also come to grief in part, but not to the same extent as the former, which caused us to stagger at first sight.

We shall therefore take issue on the findings of Mr. Doughty on the two above mentioned points; and to avoid all misunderstandings, we shall quote his statements in his own words.

He says in his paper, p. 410; note :

1st. "Towards the close of my paper I mentioned that two impor-"tant documents relating to the battle were in Europe and that at the

[1] Cf. *Quebec Morning Chronicle*, April 2, 1900. *North American Notes and Queries*, June, 1900, p. 15, and August, 1900, p. 93.

"time of writing I had not received copies. Since this paper has been "in the press I have received the two plans referred to, and they con- "firm in every respect the accuracy of the positions established on plan "A."

..... According to this plan "the army was not at any time drawn up upon the ground forming the present race course."

2nd. "The condition of the ground now forming the race course "would have prevented operations there on the day of the battle." Id., p. 418. And the same is repeated, Vol. II, p. 295, more emphatically. "On the day of the battle the ground known as the "race course was in such condition that it would have been impossible "for an army to have been drawn up there in the position indicated on "the several plans."

"The ground now commonly known as the Plains of Abraham, "which has recently been acquired by the city for a park, formed no "part of the famous battle field of September the 13th, 1759.—Id., Vol. II, p. 289.

To be brief let us point out the more striking errors of the plan "A," which crystallises the gist and purport of the whole paper, and then we shall put it in juxtaposition with the other plan, Vol. III, p. 96, the new one prepared for and approved by the authors, drawn and supervised by the same draftsmen, MM. Vallée, Charest & St. Michel, to be the true and final criterion of the position of the two standing armies.

The patience of the reader, if not of the earnest student, must necessarily be taxed by constant and tedious references to plans, but this course is unavoidable in order to thoroughly understand the controverted points on this subject.

Referring then to the said plan "A"—

1st. The spot where Montcalm is indicated to be in command, is next to impossible; topographically he is out of sight, as in a well, being at the foot of a hill and facing the rock called "La Roche Bernard" on John street.

2nd. His right wing is carried away down the St. Charles valley in Saint-Sauveur, reaching so far as the crossings of St. Monique and St. Luc streets, more than a mile from the site of the conflict on the Heights of Abraham.

3rd. His left is too near the town, cannot see the enemy, and is too far from the edge of the cliff, not to be easily outflanked there.

4th. The spot where Wolfe fell mortally wounded is carried much too far. He never reached there; this would be a quarter of a mile

from the well known place where he died (the monument); whilst it ought to be only about 100 yards from it, when he was mortally wounded in front of the Louisbourg Grenadiers.

5th. Wolfe's line in consequence is also too much advanced; and in placing it on the slope from the eminence of the gaol towards the town, Mr. Doughty is unfortunately mistaken, for it should be the other slope from thence in the direction of the river, where the Louisbourg Grenadiers and the Otway really stood according to all the plans.

6th. The camp, after the battle, was entrenched between the gaol and Sillery and not between the gaol and the town; all the maps agree on this point.

The Chronicle, Quebec, Canada, Saturday, August 4, 1900, (see appendix "A"), furnishes further details pointing out more fully these and other notable errors, which cannot be characterized and passed off "*as minor details,*" and though they were openly challenged and controverted in the press by the above article herewith produced as an appendix, they have remained unexplained and the objections raised thereto unanswered.

These material mistakes having been so signalized were, of course, corrected by the second plan, but only in part, as can easily be ascertained by comparing both together.

Now the task devolves upon us of challenging the accuracy of this last plan and of proving that it is also subject to further and important corrections, in order to arrive at the true dispositions of both armies, according to the best authorities on the subject, and moreover by means of the very plans we are furnished with in these volumes.

Considering the marked discrepancies between the two final plans presented to us as the joint work of the above named experts and draftsmen; and considering that the latter is, as it purports to be, a new and peculiar one, that is to say, *an average plan* combined from and compiled by careful measurements of all the numerous and different plans submitted to them, we have fair cause for feeling diffident, and find a double reason, in order to dispel our reasonable doubts, for examining very closely the mode of proceeding of these experts; and we are entitled to revise their finding and to ascertain the accuracy of their work. And we shall do so, even at the risk of being taxed too sharp and severe a critic, because we are dealing in this instance more with these experts than with the historians themselves; and also for the

reason that we have a sufficient excuse for our criticism in trying to probe to the bottom the truth of historical facts.[1]

It must be self evident that from and out of the number of the different plans of the battle submitted to us, one must be found more correct than all the others, and this one we shall try to find and adopt as the most reliable, and in preference to the above *average* or composite plan, which we conceive hardly possible to be historically and topographically correct for moving bodies,—though it may appear so approximatively.

Another inference follows; because the *modus operandi* conveys the implicit admission that none of them are really accurate, and in fact they all disagree more or less; therefore each one in particular is less reliable than the written and positive evidence of living witnesses at the time, who, being present, give their own true and precise relation of what they know and have seen, particularly those who have remained in Quebec.

After a close examination of all the plans produced by Mr. Doughty, we attach like him much importance, as to the general position of the contending armies, to the plan to be found in Jefferys, p. 140, which he, Mr. Doughty, reproduced in his paper, p. 304, and has copied from the same one engraved and published in 1760 for the same Jefferys. A view of the action is enlarged on the right corner.

This plan dated 5th September, 1759, drawn by a competent authority, a naval officer, is the first of all, and is the official document sent to the Minister Pitt, with the subsequent additions thereto, giving a view of the action of the 13th. It was not forwarded with the first despatches, not being then ready, but was soon after put in charge by Moncton of Townsend, the officer of distinction who delivered it at London on the 30th November following.

This plan was, with the additions, made immediately after the battle, to accompany the official report of the commanding officers of the navy and army, must be presumed substantially true and reliable. The circumstances of the extension of time required and given to complete it, and the actual presence of the army engineers, such as MacKellar, Holland, Deblieg, Desbarres and Montrésor, all tend to confirm a full reliance to be placed on this plan.

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[1] "History is a science which commits itself to no conclusions, except "such as the evidence before her warrants. . . . ."

"It is only recently, and most opportunely, that Professor Bury has "strongly asserted the right of history to be treated as a science. That is "to say, that historians should follow methods which lead to scientific "certainty."

The Tablet, London, 13th June, 1903, p. 925.

On this first branch of controversy, that is to say, the exact position of the two contending armies in line of battle and ready for action, we have three infallible and immovable land marks to work upon as certain and true basis.

1. The Buttes-à-Neveu and the line of Montcalm thereon, formed *en front de bandière,* that is a straight line of his regulars.

2. The spot where Wolfe expired now marked by his monument.

3. The other spot, quite near, on the eminence of the gaol, where he received the third and mortal wound. Moreover, we have the best of all the plans, the ground itself of the battlefield under our eyes, which hardly covers a square mile.

It is easy to find the true direction of the *bandière* line. It runs from the west side of the Tower No. 2 on top of Perrault Hill, Buttes-à-Neveu, toward and close to the west side of the General Hospital, at an angle of 45° west,—according to the meridian line of Holland, without reckoning the 30′ of its error at that time.

The proof of this direction is clearly furnished by Mr. Doughty himself, from his own showing by his plans.

Reference being had;

1. To Jefferys' plan published in 1760, p. 140, and reproduced by Mr. Doughty (Paper, p. 394); — it will be seen on the enlarged view, this line passes somewhat a little west of the General Hospital, as also on the *British Museum* plan, reproduced, Vol. II, p. 257, and Mr. Doughty carries it even more west on his plan "A," p. 378, of his paper; whilst on the other plan, also produced by Mr. Doughty and drawn for him by St. Michel, vol. 11, p. 96, this line of *bandière* is carried east a distance of 233 yards, from the General Hospital, forming a wide gap between these two *bandière* lines, measuring an angle of 28°, 20′, between them.

2. To the plan next in date of publication of Jefferys, geographer of His Majesty, drawn from the original surveys made by the Engineers of the Army, vol. 11, p. 272, which is identical with the one published by Thomas Mante, in 1772, in his *History of the late War in North America;* —it will be seen that the French line runs exactly in the direction toward the General Hospital.

3. To the large coloured and valuable plan, vol. 1, p. 264; — it will be seen that the French *bandière* is also exactly in line with the General Hospital.

4. The plan, Vol. III, p. 116, also shows the French *line en bandière,* opposite the English army, in the enlarged view of their disposition; and also the same direction is given towards the General Hospital, though these buildings do not appear on the map giving, on a smaller scale, the position of both armies.

5. The plan made in 1841 for Hawkins, in London, by James Wyld, geographer to the Queen; — the same formation of the French army is to be found.

In fact all the other plans we have been able to examine do not materially differ on this point; and therefore we controvert thereon the finding of the experts and draftsmen of Mr. Doughty on both their plans, and declare them antagonistic and unreliable, so far. We shall adhere to the plans, as they stand, on that point, and discard the average plan.

It is not supposed we are to be called on to prove the site of Wolfe's monument is the correct place where he died; therefore we shall go on to fix the exact spot where he fell in front of the Bragg regiment and the Louisbourg-Grenadiers, on the eminence where the gaol is now built.

Let us preface by adverting to Samuel Holland, assistant engineer and captain in the 2nd Battalion of the Royal Americans, who was at the battle under Wolfe, also at Sainte-Foy, and at the siege of Quebec by Lévis, where he replaced the engineer MacKellar, mortally wounded at the last battle. Holland remained at Quebec till he crossed to England in December, 1763.[1] He was there the guest of the Duke of Richmond during the ensuing winter, and in the spring, 1764, he returned to Canada with the rank of major (?) and the appointment as surveyor-general of the province. He became a legislative councillor and died at Quebec, December 28th, 1801, being 73 years of age.

In his official capacity no one knew better than he the surroundings of Quebec and particularly the Heights of Abraham, which he had surveyed immediately after the taking of Quebec and resurveyed afterwards, as appears by the several plans from his office, and notably the one on the large scale of 200 feet to one inch, drawn by Wm. Hall and by him finished 1790, and where has been traced the meridian line established by Holland in 1785. Holland is one of the army engineers referred to by Jefferys as above mentioned, and therefore may be taken as one of the best authorities as to the incidents of the battle of the Plains; and he knew exactly the spot where Wolfe was fatally wounded and the one near by where he expired.

When he traced his meridian on the Plains, he chose Wolfe's redoubt (called by that name on account of the ground where the hero had fallen), and he located the first meridian stone at the southwest angle of the redoubt, with the intention of determining and fixing, as we really believe, the very spot for the future.

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[1] Cf. Captain Bentick to Bouquet (in French), London, 7 Dec., 1763, B.M. 21, 651.

And so far he has been successful. For Bouchette, who had studied under him and became his successor in office, refers to the circumstance as follows:—

"The four meridian stones fixed in 1790[1] by the late Major "Holland, then surveyor-general of Canada, are placed at convenient "distances from each other across the plains, they represent a line "astronomically north" (variation since from 12° 35′ W. to 17°, May, "1903)," and were established for the purpose of adjusting the instru- "ments used in public surveys of lands, one of them that stood in the "angle of a field redoubt where General Wolfe is said to have breathed "his last, has been greatly impaired by the pious reverence of *curious* "*strangers*, who, wishing to bear away a relic of anything from the "spot consecrated by the hero's death, have broken off pieces of the "stone placed there thirty (25) years after the event." Cf. Bouchette *Topography of Canada*, 1815, pp. 466-67.

The field book of Holland, if found, will ascertain his intention as to the first stone of his meridian at the time of that important operation.

The field books and journals were returned by Wm. Chewett, Pennoyer, Rankin and others, and ought to be found in the Imperial Departments, London.

For Holland,[2] as Engineer-in-Chief at Quebec, claimed a number of plans that had remained in England in charge of Major Desbarres, with whom he had left them in 1776,— on being ordered suddenly from London to Portsmouth, from which place he wrote for them, but without effect. Since which, at different periods, he renewed his application but with no better result; and on the 10th of November, 1790, he sends a catalogue to enable His Majesty's minister to direct the transmission of such plans, etc., including[3] this meridian line.

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[1] The meridian of Holland must have been traced on or before 1785, since Jeremiah McCarthy, land surveyor, says: "J'ai prit le rhumb-de-vent selon la véritable méridian (sic) de Monsr. S. Holland, Ecuier, arpenteur général, tiré proche de Québec."

Procès-Verbal de bornage, Rivière-Ouelle, 18 juillet 1786. This date of 1790 seems to imply that the four stones were either replaced by others or made more conspicuous than formerly. In all cases the first duty of Holland in his official capacity (1764) would be to establish, to his satisfaction, a known meridian to work upon. Bouchette may perhaps fix that date, 1790, as the time the meridian was traced on the map at its completion.

[2] Writing to the Governor, Lord Dorchester, Quebec, November 1st, 1790, he represents that several of the principal and original plans and surveys of the Province were wanting. They were left by him in the care of Major Desbarres in May, 1776. Within a late period many of these documents were returned and have remained dormant in boxes at Ottawa.

[3] "Meridian Line at Quebec (2 cop.), 4 chains to 1 inch." *Archives of Canada*, Q., Vol. 49, p. 167, 119.

After Bouchette, we find in the same department, John Adams, R.M.S.D., re-affirming the statement relative to the position of this first stone, as being the place where Wolfe fell. On a plan made by him from actual and original survey, 1822, engraved by E. Bennett, Quebec, and dedicated to Lord Dalhousie, there is marked in front of and the west side of the redoubt: "*Wolfe's Redoubt near which he fell.*" Though the redoubt has disappeared its location is well settled and known by the plans. It covered a part of the ground of the east wing of the gaol, and the stone was planted in its yard, in line with and twenty feet from the west wall of this wing.

This plan may be seen at the City Hall, and the quoted inscription may well serve to account for the continuation of the interest and reverence attached to this spot by visitors and strangers. For it was, down to the year 1835, the date of the first monument to Wolfe, on the Plains, the only visible sign on the Plains to remember his glorious death, and was at the time believed by many to be the actual spot where he died, until the erection of the monument determined forever the sacred ground where "he breathed his last."

This continued and beloved tradition, based upon this meridian stone, if untrue, could not possibly have been countenanced by a number of living witnesses, who had been at the battle. No one will believe that Holland, during more than fifteen years that he saw the people's reverence for this landmark, could lend himself to a shameful deceit; the more so as there were at the time, in and around Quebec many survivors of Wolfe's army, such as the two Frasers, Nairne, James Thomson, etc., also Carlton, Lord Dorchester, afterwards Governor-in-Chief of the Provinces, without reckoning a great many more abroad, and particularly his co-workers in the original plans.

The cherished memory of Wolfe went on increasing in Quebec, as proved by the erection (began 1827), of the monument to him and Montcalm, his brave opponent, and terminated in 1834, when affixing together thereon the names of the two heroes.

Shortly afterwards (1835), the Governor, Lord Aylmer, erected the first monument on the Plains.

It is a pleasure to quote on this subject the brilliant scholar, the learned and gentlemanly editor of the old *Albion*, our late Dr. John Charlton Fisher, LL.D., who wrote in the *Quebec Mercury*, September 17th, 1835, an interesting and appropriate article bearing closely to the site of the above meridian stone. It is headed: —

"Monument on the Plains of Abraham to the Memory of Wolfe."

"The last anniversary (1834) of the Battle of the Plains of Abraham was aptly chosen as the day on which the names of the heroes *Wolfe and Montcalm* were affixed on the sarcophagus, on which rests

the beautiful obelisk raised in their honour by and during the government of the Earl of Dalhousie (1827). The return of the anniversary may be appropriated to a brief description of the monument lately erected by Lieutenant-General Lord Aylmer, while governor-in-chief of the provinces, which completes the series of testimonials offered by posterity to the memory of the devoted and the brave."

After mentioning the monument to Wolfe and Montcalm and the slab in the Chapel of the Ursuline Convent, "Honneur à Montcalm, etc.," he continues:

"A monument to Wolfe on the spot where he died was alone wanting. The exact spot was known to but few, while the interest attached to it was increased by the lapse of time.

"The last contemporary of the Battle was no more[1] and the site would in a few years have become a subject for conjecture.

"Although the stone, which formed his death couch, had been preserved in its original position, it had been sunk beneath the surface, in order to protect it from pilgrims who came, not to enrich but to rob the shrine, by carrying away as relics pieces of the rock, hallowed by the death of Wolfe.

"These considerations, it may be imagined, suggested the design of erecting a monument on this spot to Lord Aylmer.

"And as no accurate description of it has yet appeared, and as the spot is constantly visited by strangers, the following particulars, which may be depended upon as correct, will doubtless be interesting to the public."

"The monument lately erected by Lord Aylmer to the memory of Wolfe, on the spot where he died, is situated in a field, the property of Hammond Gowen, Esq., between the house of C. Campbell, Esq., and the race-course, and adjoining the *Grande-Allée*. The ground necessary for the site was presented by Mr. Gowen to his Lordship for the purpose; and the monument is distinctly seen from the road.

"The monument is a truncated column, etc. The inscription, which is deeply cut in the column, is brief and emphatic, containing a modest and delicate reference to that upon the slab in honour of Montcalm.

"*Here died Wolfe victorious.* . . . . .[2]

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[1] Mr. James Thomson died in 1830. He was in his 98th year when Lord Dalhousie, on the 15th Nov., 1827, addressed him as follows: "We honour you here as the companion in arms and a venerable living witness of the fall of Wolfe; and do us the favour to bear witness on this occasion by the mallet in your hand."

[2] In 1848, Sir Benjamin Durban erected the one now over it, burying underneath the remains of the old one. A strong iron railing protects it.

"The spot where Wolfe received his third and last wound was in front of the Redoubt[1] on the rising ground, somewhat on the right and in advance of the monument. He was thence borne to the rear and supported against the rock, lying on the surface.

"In a small field, the property of Mr. Moorhead, between the one in which the monument is situate and the property of Charles Campbell, Esq., about fifty yards to the north from the column, immediately joining the fence, may be seen the remains of a well whence Wolfe was supplied with water, when lying faint and dying on the spot now marked by the column. This has been ever since known to the old inhabitants of the neighbourhood as "Wolfe's Well;" but in consequence of a horse having been drowned in it about four years ago, was filled up with rubbish, to the great regret of many who have never ceased to hold it in hallowed remembrance.

"Such is the interest attached to the scene of the glorious event, that a public debt of thanks is due to the distinguished General Officer, who during his administration of the province acquired by Great Britain at the price of Wolfe's death, has taken care at his own expense, to mark this sacred spot in so conspicuous and appropriate manner that it never afterwards can be overlooked and forgotten.

"Quebec, September 13th, 1835, J.C.F."

It it were in regard to topography alone, it is obvious too much importance cannot be attached to point out the very spot where Wolfe fell. A searching light thrown on surrounding details and circumstances, will lead us to the point we are looking for. The location of the above stone corresponds very closely with the distance of *about 100 yards*, given by James Henderson of the 28th regiment, who then stood quite close to the General and carried him off at once to the rear. *Id. Vol. III, p. 215.* The measured distance from the centre of the monument to the meridian stone is 380 feet, only 26 yards more and closely corresponding to such space of "*about 100 yards.*"

Mr. Doughty had, in first instance, marked the spot on his first plan "A," (p. 378 of his paper), quite near the Orphan Asylum on the Grande-Allée; that is somewhat over a quarter of a mile east of the monument. He has now receded from this place on his second plan to the eminence of the gaol, coming back near the Holland stone, and indicating by a red star his finding on his plan, Vol. I, p. 96. It is distant only 250 yards from the monument as we shall see.

This egregious discrepancy must unavoidably lead us to distrust both plans and his expert draftsmen when compiling their average plan.

[1] The front is indicated on the plans by the *flêches* pointing west, and as indicated by Adams & Holland.

Moreover we are in a position to demonstrate on view of the other plans above referred to and by his own documents, that this red star is carried by Mr. Doughty

1st. Too far north, and

2ndly. Too far east,—

though he affirms, Vol. III, p. 204, that "*there is no longer any possible doubt where he (Wolfe) fell;*" and he refers to the indication on the King's map, in the British Museum as a proof. It would have been more satisfactory to the reader to have seen reproduced and published that small part of this large map (a copy being in the possession of the authors (Vol. VI, p. 281), in order to let him judge for himself, instead of relying on Mr. St. Michel's average plan, who remains convicted of previous fatal errors. Perhaps we might, on examination, find him and the authors again in error on this as on the other points above referred to.

Moreover this famous very large map[1] was made abroad, a certain time after the battle, and borrowed and compiled from maps on a small scale then in existence, and not from actual operations on the ground; and it must not clash with these; and moreover ought not to counterbalance the certain knowledge and convincing evidence of the witnesses who remained on the spot, at Quebec, and visited it for years thereafter as a shrine of glorious reverence and deep sympathy.

Let us assume for the moment that this red star points to the corresponding place on the King's map. It is easily proved that all the three companies of the Louisbourg Grenadiers stood, not on the eminence of and in front of the gaol, nor in front of the monument, but somewhat further down on the slope from this eminence, beginning therefrom and in the direction of the river, exactly where Mr. Doughty, in first instance had placed the Otway; and therefore the whole right wing of Wolfe must be drawn nearer to the verge of the cliff, because :

(a) The first plan of St. Michel (Paper, p. 378), renders this clearly apparent by the position occupied by the Otway near the brink of the cliff, and not adjoining the gaol as shown on the second plan;

(b) On Jefferys' plan, the official one accompanying the dispatches, the same Otway will also be found close to the cliff and the Louisbourg Grenadiers, on the slope, a little in advance on its left;

(c) The other *correct plan* of Jefferys', Vol. II, p. 272, "*considered of great importance,*" Vol. VI, p. 280, places no less than five regiments on the south side of Louis road, including two of them further south than the lower road of the Plains, and therefore these two are, on the

[1] The scale is not given, but we calculate it to be 100 feet to 1 inch.

slope of the eminence, whilst Mr. Doughty's plan shows only one, the Otway, there and adjoining the gaol;

(*d*) The combined plan of Deblieg, Holland and Desbarres, Vol. I, p. 264, (36 inch by 18), seems a reduced copy and not a fac-simile of the original (size 5 ft. 10x2 ft. 4 in. Vol. VI, p. 280). The line of the English differs considerably from that of the Doughty plan which, in contradiction to that of these three engineers, places Braggs' regiment on the *north* side of St. Louis Road, instead of the *south* side and on the eminence.

(*e*) We would prefer relying on the official plan of 1841, by Jas. Wyld, geographer to the Queen and of H.R.H. Prince Albert, dedicated to the members of the United Services of the British Empire,—in preference to the one of Mr. St. Michel, and locate the Braggs regiment south of the road, then the Louisbourg-Grenadiers on the slope, in circular form, and the Otway quite near the cliff. We cannot, therefore, admit with Mr. Doughty "that all the plans agree as to the exact position of *Braggs' regiment and Louisbourg-Grenadiers*, when they received the French assault," for the simple reason that his and his alone disagrees with them all; but we take note of his remark and admission, that this last map of Wyld prepared for Hawkins, "his latest work, *agrees with the maps of those who were present*, is in itself significant." (Paper, pp. 402-403.) We therefore stand by it with his approval.

It is unfortunate that Mr. Doughty contradicts himself in thus placing the Braggs north of the road, the Otway adjoining the gaol, and the whole of the Grenadiers on the eminence, whilst he says elsewhere the Braggs, 28th regiment, occupied the eminence, the Grenadiers stood on their right, and the Otway was extended between these and the ridge of the cliff.

He writes, Vol. III, p. 120:—

"Prior to the arrival of these reinforcements some of the Canadian troops had endeavoured to slip around the declivity between the British right and the St. Lawrence. The movement was quickly observed by Wolfe, who advanced some platoons from the Louisbourg-Grenadiers and the *28th Regiment* (*Braggs*) *to the small rising ground on his right*, to intercept it, and as soon as Otway's regiment, the Thirty-fifth came up, he further strengthened his right by extending that battalion between the Grenadiers and *the precipice* (sic) sloping towards the river, and to form part of a second line upon the right."

And in Vol. V, p. 30, we read the following passage of *the Fragment of the Siege*: "The Louisbourg-Grenadiers were extended on the right of these regiments to the river." That portion of the slope continues from the eminence, which is said "distant about 500 yards from the ridge." Vol. III, p. 118.

Thus Mr. Doughty reverses Wolfe's tactics and leaves a wide gap for the enemy to slip along the cliff and outflank his right. And here we may add that Mr. Doughty has fixed (Paper, p. 384), the effective range of the musket against troops in column 200 yards (Wolfe also). Thereby he nullifies the then required efficiency of the fire of the Otway as Wolfe would have had it.

Our conclusion then is that on the Doughty plan, the Otway, the Louisbourg-Grenadiers and the Braggs must necessarily be all carried down southerly some 100 yards distance towards the cliff, and the spot marked by the *red star* shall come nearer south, so as to be in line with the meridian stone, if not out-passing it. The Sergeant-Quartermaster Johnson, present on the field, confirms this southern position (Vol. V, pp. 103-4), on the right wing, occupied by the Louisbourg Grenadiers, at the head of which Wolfe sometimes commanded and sometimes at the head of the former,—"and advanced at the head of the Louisbourg "Grenadiers, with charged bayonets, when another shot pierced his "breast."

We have seen that Wolfe had just sent the 28th regiment, Braggs, to the small rising ground on his right (the eminence of the gaol), so that it could not stand *north* of the St. Louis Road, as Mr. Doughty will have it. It must be left standing where directed by Wolfe, about 100 yards south of the road, having on its right the first company of the Louisbourg Grenadiers. So much the worse for the average plan of the experts and the red star of Mr. St. Michel.

Next we intend to prove satisfactorily that the alleged distance east from the monument to the point of the red star is overstretched and is not 300 yards.

First of all, according to the scale of this plan, it is only 750 feet or 250 yards; also the same measure is found on the official plan of the cadastre. This is, to begin with, a recoil of 50 yards.

Secondly, adopting as a basis for correct measurements, the true *bandière* line above mentioned in the direction of the General Hospital, and closing west the angle of 22°, 20′, which it forms with the *bandière* given by Mr. St. Michel, we shall have *mutatis mutandis,* another retrogression of the whole English line proportional to the cord opposite the star, about 85 feet, or 28 yards, reducing in consequence the 300 yards to 224 only.

Now since the exact distance from the meridian stone to the monument is exactly 126 yards, there remains only the small difference of less than 100 yards between the landmark of Holland and the point indicated by Mr. Doughty: a trifle. But, even without reckoning these deductions, the whole difference could not exceed 174 yards. We shall not therefore allow Mr. St. Michel to remove our well known land-

mark,—since he has demonstrated his professional *savoir-faire* to be on a par with his historical accuracy as to St-Sauveur.

If we are to believe the evidence of James Henderson, the very best witness on the occasion, who supported Wolfe to the hollow ground in rear, a distance of "about 100 yards;" and consider that the 224 yards of Mr. Doughty would hardly out-pass the eastern limit of the redoubt; and that our basis and calculations are not mere verbal criticism, nor intended for a mere show of accuracy, but to arrive at a certainty of knowledge and conviction, based upon reliable geometrical lines, measurements, boundaries and land-marks; also the broad fact that, in contradiction to the large distance first given of a quarter of a mile, Mr. Doughty comes back so close to Holland's land-mark; and moreover, when we take into account the continued popular tradition and reverence (without any doubt ever being raised), for this sacred spot,—it is reasonable to believe, with the weight of the evidence before us, that Holland has irrevocably marked the spot where Wolfe fell; and it will, to the latest day, continue to be visited with the same deep interest and patriotic emotion. It would, in our estimation, be cavilling and hair splitting not to adopt the redoubt as the place where Wolfe fell, and wherefrom it took the name of WOLFE'S REDOUBT.

We next come to the second point of controversy;—does the race-course form part or not of the battle field?

The general outlines of the battle are not in dispute among former historians; and men of learning agree in placing the brunt of the fight on and between the eminence of the gaol and the Buttes-à-Neveu or Martello Towers along there.

Even Hawkins, who is so severely taken to task by Mr. Doughty, says: "The severest fighting took place between the right of the race "stand and the Martello Towers."

The assertion of Mr. Chambers (?) in the *Quebec Morning Chronicle, April 2nd, 1900, that*:—

"It is generally understood that the fiercest of the fight took place "upon that ground which is now the race-course, and this stand has been "taken by Sir James LeMoine and P. B. Casgrain,"—is simply unfounded in fact. *V. Conférence par P.-B. Casgrain,* 14 décembre 1899, in *Transactions of the Literary and Historical Society of Quebec, 1900.*

The pretensions of these writers and of those who are conversant with the subject, go no further than to show that this part of the Plains necessarily formed part of the battle field, as a ground to be held and kept by all means, being the key of the position and the only road and means of communication with the fleet for the stores and ammunitions; that military operations did effectively take place there on that day; that

part of the English line was drawn up on this ground and marched to the eminence; that Webb's reserve stood on the race-course during the fight; that the 3rd batallion, the Royal Americans, was detached further back on Marchmont to secure the landing, and "stood there as a post to pro-"tect the rear;" *Vol. II, p. 296,* and that whilst the English were there and forming around, they lost more men than during the rest of the day. Vol. V, p. 54.[1]

Unfortunately for Mr. Chambers he is the guilty party for giving currency to the erroneous version of this event which he now repels. He says in *Chambers' Guide to Quebec,* p. 93:—

"The Plains of Abraham, properly so called at the present time, "stretched away from near the St. Louis toll gate westward, upon the "south side of the road, and extend from the highway to the brink of "the steep precipice overhanging the river. The battle field is govern-"ment property, but is at present rented as a pasturage for the cattle "of city milkmen.

"It was during the British assault upon the French position on "this rising knoll (yonder knoll of the gaol), that General Wolfe "received his death wound."

Leaving aside this statement, we shall continue on the second point, and in support of our contention we abide exclusively by the proof to be extracted out of the writings, plans and appendices to be found in the volumes of *The Siege of Quebec* now before us.

As it is rather difficult to represent on a map moving bodies, we place more reliance, as to the march of troops, on the evidence given by the officers then in their command, than on any other source.

Colonel Hon. Malcolm Fraser was in command of the Fraser Highlanders on that day, and thereafter remained at Quebec, as also his friend and neighbour, Captain Nairne of the same regiment. We quote from his journal where he gives a clear, concise and true statement of what they both did, and saw with their own eyes on this occasion.

"We had several skirmishes with the Canadians till about ten "o'clock when the army formed in line of battle.....in front the "town of Quebec about a mile distant" (the mile is 66 yards beyond the "east line of the race course);" in the rear, a wood occupied by the "light infantry (who by this time had taken possession of the four gun

[1] Hawkins may not be wrong when he extends the battle from the race-stand, for the reason that so far the English had already lost "more men "in killed and wounded in skirmishing than in the general action." Moncrief, V, p. 54.

"1,500 of their best marksmen kept a continued fire upon our line for "some time before the battle became general." Sergeant Johnson, V, pp. 103-104.

"battery); and the third battalion of the Royal Americans. In the "space between which last and the main body, the forty-eighth was "drawn up as a body of reserve." This general disposition of the army, that is to say, the line, the reserve and the rear, is confirmed by the historians, and also by several of the maps and plans of the battlefield and forms a total linear space less than 1000 yards from front to rear. (2,950 feet), that is to say from the gaol to the post on Marchmont.

Col. Fraser continues : "The army was ordered to march on slow-"ly in line of battle, and halt several times, till about half an hour "after ten." Here begins the real point of controversy, the gordian-knot, which we shall try to untie before cutting it. Did the army march in line as thus stated? or was it formed into line at once on the eminence of the gaol and from thence extended on each side? We shall use the words of Mr. Doughty on this march. (Paper, p. 378) "By "referring to plan A, it will be seen that a very short march would be "necessary to bring the army to the line indicated on the plan." He means from the eminence of the gaol, past de Salaberry street, to a point near the Orphan Asylum, where Wolfe is indicated to be in command and fall, 1175 feet of actual march.

As Wolfe's Redoubt, where he fell, stood only 475 feet from the eastern boundary of the race course, this slow march would then commence 1175 feet west of this redoubt and be a space for marching of 700 feet, on the plains towards town. We are willing to be generous and give away 500 feet to Mr. Doughty, being satisfied with the remainder. And thus we shall be west of, near to and on line with Maple avenue, "on the open ground," and the perfect level shown there in all direction; the same referred to by Captain Knox when speaking of the ground upon which the army halted after its march towards town in files as being "an even piece of ground which Mr. Wolfe had made "choice of."

The first formation may reasonably account for the heavy losses then and previously thereto suffered on the English side by the galling fire on their whole line, continued from a few brushes and a little hillock from Canadian and Indian skirmishers, snap-shooters and skulkers, on each wing and on the rear. Vol. V, pp. 28, 104.

Knox, quoted by Doughty (Paper, p. 374), states that after the line was formed..... "About nine the two armies moved a little nearer "to each other.".....

"Les deux armées," says *Le Journal de l'Armée, séparées par une petite colline,* se cannonaient depuis "environ une heure."

Mr. Doughty himself confirms such eminence in front (Paper, p. 402). "The General before the battle, while reviewing the position

" of the armies, saw that it was an advantageous position and sent a " few men to occupy it."

This *colline,* the eminence of the gaol, or hillock, evidently had not yet been reached by the English, and it obstructed Wolfe's view of the enemy; also concealed his troops from them. The letter of James Henderson, of the 28th Regiment, Braggs, dated at Quebec, October 7th, 1759, is exactly in point:..... " the general viewing the posi- " tion of the two armies, he took notice of a small rising ground between " our right and the enemy's left which concailed (sic) us from that " quarter, upon which the general did me the honour to detach me with " a few grenadiers to take possession of that ground and maintain it to " the last extremity, which I did till both armies was (sic) engaged. And " then the general came to me and took his post by me. But, oh..... " was scarce a moment with me when he received his fatal wound."

Wolfe had scarcely given the order to advance when he sank to the ground. Vol. III, p. 203.

In fact the first and final formation of the line of battle " were "formed immediately *in front of the eminence of the gaol,"* Vol. III, p. 118, 9; *the right near the summit of the cliff* overlooking the St. Lawrence, and the left *en potence,* near the Ste. Foye road. The crest of this eminence between the two armies was reached by this line so formed and is well delineated on the plan, Vol. II., p. 254, showing there the array of the English army. " Mr. Doughty repeats that shortly after nine, the two armies moved a little nearer;" this short march may have been the last halt of the English after attaining the above crest. In any case this advance could not and did not exceed, at most, the 300 yards beyond the front of the monument, according to Mr. Doughty; and such space we reduce to 100 yards.

Mr. Doughty says, III, p. 207 : " It is quite clear he (Wolfe), sur- " vived his removal to the rear of the army but a few minutes." As it is well known he asked as a favour to be laid down, being unable to go any further; what about the 200 yards additional? The presumption would be that he would have expired on the way.

This much being said and so far settled, as to the place of the formation of the line and its last stand, we shall see how it has a direct bearing on determining the position of the 48th Regiment, the Webb, under Colonel Burton, forming part of the second line or reserve on the right, and drawn up in eight subdivisions. We need not trouble ourselves with the reserve on the left; it was ordered to stand and stood " 800 paces from the line," that is 2000 feet. Vol. III, p. 93. Some of the plans even show the Webb in line with it. II, p. 257.

It must be known that on the plains there existed two roads, the *Chemin St-Louis,* and another, the lower one, leading from the Foulon, running not far from the cliff, and joining the first named road at the eastern end of the race course, in a diagonal direction, and rather free and indefinite there. This lower road was never legalized, that is to say, made a public highway or legally settled as such by a *procès-verbal du Grand-Voyer.* It always remained till quite lately, a road of convenience, *de tolérance* and is now shut. This is the "convenient road" mentioned by Knox.

A glance at the different maps in these volumes, I, p. 264,—II, p. 257—II, p. 272, letter K,—and Hawkins' plan, will show that the reserve of the Webb was stationed between these two roads, at a distance from the line varying from 800 paces (II, p. 257, III, p. 116), to much less no plans, Vol. I, p. 264 and p. 257. On Hawkins' map it appears more distant than the space between the two armies. A fair average would locate the Webb at *mid-distance* between the main line on the eminence and the post in the rear, the Royal Americans; and in any case somewhere on the ground of the race-course, not nearer than the old stand, being the least possible distance by the plans, that is to some 400 feet from its eastern side. The whole space of the battle field thus occupied by the British troops (without reckoning the advanced platoons and scouts), would not then exceed 20 *arpents,* to use this better understood measure.

Now we are at a loss to understand the possibility, by Mr. Doughty, to extricate the Webb from the Plains or race-course. The standing of Burton's reserve within 30 yards from the spot where Wolfe died, forcibly reminds his placing of Montcalm's right in St-Sauveur.

Is it then unfair to ask the collaborators to this part of the narrative, if they all persist in affirming that the Webb reserve was not on the race-course, because we frankly give them credit that their false conclusions are errors in argument, not a breach of veracity. A submissive silence could be taken as a suppression of truth or a reticence.

Let us now come to some active military operations on the same race-course from the beginning of the day.

We shall not take into account the landing of the troops on the beach at l'Anse-des-Mères, right opposite, and all along the beach of this ground, then forming part of the whole property belonging to the Ursuline nuns down to river and low-water mark.

But this act of hostility so far, was resisted from above the cape, as we shall see.

On this subject we read that:

After the capture of Vergor's post (see this post indicated by tents, Plan, V, 11, p. 257) his dying guards were still lurking *in the adjoining*

field or field of Indian corn extending on Marchmont and on the Plains. They were followed by a few grenadiers and the party who had reached the summit of the cliff. "The fugitives fled before them and, being "vigorously pursued, their lieutenant, his drummer, and several of the "men were taken prisoners. The remainder escaped from the field, "*passing through the bushes which surmount the cliff* and endeavoured "to reach the shelter of the town." They fled to and joined the post at l'Anse-des-Mères.[1]

They must necessarily have covered the ridge of the race-course on their way, because they kept firing all along on the boats.

For we read again:

Col. Howe having taken possession of the St.-Michel (Samos) battery, "drove in all the small parties which were posted on the "heights and annoyed our columns going up the Hill." The Townshend Papers, Vol. V., p. 214; *ibid.*, p. 268.

"The light infantry was disposed, some in the woods upon our "left flank, to cover that side, *and others to scour the face of the bank* "*towards the town.*" Vol. V, p. 50.

And this is confirmed also by Moncrief, who says, that after the taking of Vergor's picket and some prisoners,—"the remainder made "their *escape along the edge of the bank* toward the town, and with some "small flying parties *posted there* kept firing upon some of our boats, "which had by mistake dropped down too far that way, where the "general was obliged to follow in his own boat to order them back." Vol. V., p. 50.

Vol. III., 81.—"A few of the boats of the second division, swept "down by the ebb tide, had passed the landing place and were endea-"vouring to effect a landing at l'Anse-des-Mères, somewhat nearer the "city. They did not accomplish their purpose, for some of the pickets "who had escaped from the posts commanding the precipice, pre-"vented their disembarkation. Then Wolfe came." . . . . . .

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[1] The site of *L'Anse-des-mères* properly so called according to Bouchette, would be placed at the south-west extremity of Cape Diamond, not very far from the wall of the citadel, where a small cove is indented in the cape and is now called Diamond Harbour.

It is to be found in the same locality under the same name of *Anse-des-mères*, according to the plan by A. Larue, surveyor, published by Wm. Cowan & Son (without date, but known to be 1832), and lithographed by Allan & Ferguson, for Robert Weir, wholesale stationer, Glasgow.

But it is now well known, that from early times, the popular acception of l'Anse-des-Mères, was at mid-distance from the town and the Foulon. Franquet, the French King's engineer (1752), placed it *à un quart de lieue de celle du Foulon*;—that is on line with the east end of the race-course; it is known to-day as such. The plan Vol. II., p. 272 (also in Mante), shows the last boats landing there, having been carried down so far and they were fired at from the post above.

Other operations on the same Plains preceded the real conflict.

We have seen that as soon as the remainder of the Otway came up with the second convoy, it was ordered straight to re-enforce the right and intercept the enemy's advance along the edge of the cliff. They must, in consequence, have followed the lower road on the Plains leading in right direction to the post assigned to them.

It is unlikely that this regiment, out of a loss of 54 men in killed and wounded, none should have then fallen from the constant fire of skirmishers, so numerous all round, as may be seen on the maps and especially on the one of the British Museum. Vol. II., p. 254. This is the more likely because the Otway, during the conflict, was stationed on the second line as a reserve.

At the same time, the British brought to the front two brass 6-pounders, which the sailors had dragged up the Foulon path and along the lower road.

This operation is distinctly indicated on the same map of the British Museum, thus: "*D, English artillery march;*" the two pieces following this road and joining the St. Louis road. There they were placed in position with the line by about eight of the clock.

Seeing again the number of flanking parties surrounding the English on all sides, it is probable some of the sailors and gunners must have also been fired at, and may be comprised among the eight gunners and matrosses of the artillery killed and wounded.

Now, whether the race-course was or was not a fit ground to deploy troops, the above described military moves and operations nevertheless took place there.

At all events, the foregoing skirmishes and operations seem a sufficient rebuttal to the broad assertion of M. Chapais, that not a soldier did fight on the race-course, and not a drop of English or French blood was shed there on either side.

We may now appeal to the commanding officer, Brigadier-General Townshend, who declared prisoners of war all the French wounded lying in the General Hospital, because it formed part of the battle field; he would not have scrupled to extend the whole battlefield from the Samos battery and Vergor's post to the same hospital. A military writer would not hesitate to extend it from the landing place to the pontoon-bridge on the St. Charles river, since the firing continued all along.

It seems to us that any reader must have a mighty and inveterate proposition to struggle with, should he be unable, with these data, to recognize the race-course as forming part of the battlefield.

For him, and in last resort, we shall proffer the best, and in our apprehension, a convincing final evidence from the authentic "*Memoirs*

of the Siege of Quebec," by Quarter-Master Sergeant John Johnson, who is admitted a good witness and a competent authority.

We shall simply quote his own words in relation to the battlefield:

It is proper to state that Sergeant Johnson took part in the first battle of the Plains, and was also fighting hard at the battle of Ste. Foye, or rather Sillery, as more properly named by the English. We take it as well known that Lévis won the day by taking his enemy's left in flank and in rear, having succeeded in pushing Colonel Poularies with the Royal Roussillon far enough along the cliff, so that by a rush in flank and by a reverse attack, he broke General Murray's line, and thereby decided the victory by a complete rout and flight of the English troops.

This happened at the west end of the race-course.

Here is what Sergeant Johnson says three times as to the battlefields: . . . . . "It did not appear that either the officers or "men were in the least intimidated, as, trusting in the same good "Providence, that had gained us that glorious victory, *on the same ground* the thirteenth of the preceding September." Vol. V., p. 120.

. . . . "Again, Although our men were as zealous for the "service of their country, and the honor of His Majesty, as they "were in that battle fought on the *same ground* the thirteenth of the "preceding September; . . . . *Id.*, p. 122.

". . . . In two memorable actions: One on the thirteenth "of September, the glorious day wherein we gained the full reward "of our toil and labour in the siege of Quebec; and again on the "twenty-eighth of April, on the *same ground. Id.*, p. 159.

It is then not surprising that the common sense of the people of the Dominion, supported by the same sentiment from abroad, cut short the controversy and settled *de facto* the disputed historical point.

The Federal Government, yielding to the pressure of public opinion, purchased the Plains of Abraham and handed them over to the city of Quebec, to be used and kept as a park and a national possession. They are thus to remain in perpetuity a testimonial in honour of the brave soldiers of the two great nations who inhabit this country, who then shed their blood, fighting against each other on these grounds, and now live together in peace and amity, for its common welfare. But above all, they shall be held in cherished and holy remembrance of the dying heroes

Wolfe and Montcalm.

Humanum est errare.—Therefore, we invite students possessing historical, military and geometrical qualifications to revise our findings, and we will be glad to correct any error we may have fallen into,

because it will turn to the more perfect discovery of truth and to the best advantage of our history; also it will serve to enhance the value of Mr. Doughty's able and remarkably useful contribution.

APPENDIX.

Where the Battle of the Plains of Abraham was Fought. An Answer to Mr. Arthur Doughty.

The Question Discussed by Mr. P.-B. Casgrain.

A brief review of the paper published in the Transactions of the Royal Society of Canada, 1899-1900, Vol. V, p. 359, "The probable Site of the Battle of the Plains of Abraham," by Arthur G. Doughty.

K. Henry — What is this Castle called that stand hard by ?
Montjoy — They call it Agincourt.
K. Henry—Then we call this the field of Agincourt.
—*Shakespeare, Henry V., Act 4, scene 7.*

So might have said the immortal Wolfe, to his surrounding companions, when, dying in the arms of victory on that glorious day, the 13th September, 1759, he cast a last failing glance on the field around him:—"Let this be called the battle of the Plains of Abraham."

And so it will be known for ever by that appropriate name and all the field around the spot where he breathed his last.

Credit is due to the author of the cited monograph for his 18 months' researches to elucidate, according to his own light, the "probable" site of that memorable battle.

We are fully convinced that he is as intent on arriving at the whole truth as he and we are intent on suppressing no portion of it.

Should the writer have erred, as we propose showing, it is meet erroneous statements and unwarranted conclusions should not pass unchallenged; otherwise they might go abroad in future as uncontroverted historical facts, the more so, because they appear under the auspices of a learned and distinguished body such as the Royal Society of Canada.

We are not yet sure, unless further and better proof be furnished us, that, as alleged in the *Morning Chronicle* of April 2nd, in reference to the same paper, "the author has made a discovery to which older and more distinguished men have been blind for years * * * * * and that the ideas that have prevailed among the ignorant and learned alike for nearly a hundred years have been woefully unfounded."

The contention of Mr. Doughty is that the race course does not form any part of the battlefield and that the fighting was confined between de

Salaberry street and the walls of the city (p. 360); moreover, that the condition of the ground now forming the race course would have prevented operations there on the day of the battle (Note 5, p. 418).

On the other hand, what is now asserted, as based on tradition and the documentary evidence, is that the English army was formed into line across the race course and extended from the ridge of the cliff to and beyond the Ste. Foye road; that the opening of the battle on the English side took place when and after they had advanced on the eminence of the gaol, where they awaited the fire of the enemy; and that on returning the fire and charging, the fight extended from thence to the walls of the town and down the valley of the St. Charles to the bridge of boats.

Mr. Doughty ignores the operations at Sillery, in the morning, the firing and skirmishing between the two foes for more than an hour by outposts, before and during their forming into line; also the advance, by several halts, during half an hour, before the battle, of which he treats very lightly.

Mr. Doughty will allow us, therefore, a fair, impartial and brief criticism in examining carefully some of his statements and more particularly the plans on which he bases his theory and on which he relies as the gist of his contention.

1. Referring to the plan A, p. 378, being a reliable plan of the City of Quebec, with the neighbouring country extending to Marchmont,— as it appears to-day,— the position of the regiments of both armies, English and French, are indicated by black marks, as standing ready for action.

This plan is drawn by St. Michel, June, 1899, and enlarged from the original, which is on a very small scale, and which was edited in 1760 by Thos. Jefferys (not Jeffreys) in his "Natural and Civil History of the French Dominion in North and South America," London, 1761.

The extreme right of Montcalm, composed of the burgess of Quebec and Indians, is made there to extend in the valley of the St. Charles, now St-Sauveur, from below the Coteau Ste-Genevieve, opposite Martello Tower No. 4, so far as the corner of the modern streets St. Luc and Ste. Gertrude, covering a space of more than half a mile in length in a westerly direction.

We confess we hardly credit our eyes, so contrary is such position to all the historians and to Mr. Doughty's own text.

(*a*) We have always read and believed that both armies, as a whole, met on the Heights of Abraham.

(*b*) That the burgess of Quebec and the Indians occupied the crest of the *Coteau Ste-Geneviève* and extended even beyond the reserve of the English left.

(*c*) On the plan they are entirely cut off from the main body by the steepness and height of the *coteau* and by their distance.

(*d*) In that position they have no enemy to encounter, and would have to scale this cliff before reaching him.

(*e*) This position differs *in toto* from Mr. Doughty's own text.

At page 391 he quotes Entick as mentioning the "Canadians as being placed on the bank, and on the borders of the Cote Ste-Geneviève, and on his plan, which is apparently the same as Jeffreys, the Canadians are shown to be in this direction."

And what is more, he himself says that on the plan (A) it will be noticed that the Canadians are placed on the sloping ground of Cote Ste-Geneviève.

They ought to be, but they are not.

"All this evidence," he adds, "confirms the accuracy of the plan, so far as the position of the Canadians are (sic) concerned.

We admit our impossibility of conciliating the text with the plan, however carefully measured and prepared by Mr. Charest (p. 365). It is erroneous.

(*f*) If so, it remains evident, as a consequence, that the whole line of Montcalm, being thus carried up half a mile, without any apparent gap, is shown not to be able to extend far enough on its left to meet properly the right of Wolfe, which reaches very near the edge of the Cape.

(*g*) P. 401. To maintain the French battalions drawn into a straight line, *en front de bandière,* as he was forced to do, he is more unfortunate than Mr. Hawkins, whom he alleges to have been so because he proved too precise as to the relative positions of the army (French).

Mr. Doughty might have found the terminus *a quo et ad quem* on Jefferys' plan and in the text of the latter; and also on Hawkins' plan of 1841 (which he does not controvert); that line passes from the General Hospital to the heights of the *Buttes-à-Nepveu,* or Martello Tower No. 2.

(*h*) By placing the French line midway between Lewis Gate and the *Buttes-à-Nepveu,* on his plan A, Mr. Doughty has failed to observe, as a fact under his eyes every day, that the down grade from these Buttes to that middle point is such that the troops could not see, nor even be seen by the enemy from thence.

2. Now let us examine the position of the English battalions on the same plan.

Their front is nearly a straight line, having the two extremities formed *en potence* towards each cliff, and a reserve at some distance behind.

(*a*) The Amherst Regiment is placed on the verge of the coteau Ste. Geneviève, one branch of the *potence* covering it and the other facing west towards the Indians.

(*b*) This formation at this point is impossible according to Mr. Doughty's own text, because it would be exactly in the middle of the French line of Canadians bordering the same coteau.

(*c*) The object of forming *en potence* there would cease to exist, since it was formed with the view of preventing the French from turning the English flank at that point.

(*d*) This *potence,* as a matter of fact, was at some distance from the cliff and near Ste. Foye road, and was covered in rear from the Indians by the Royal American and light infantry.

3. By thus disposing the English line as shown on the plan A, it will be seen:

(*a*) That Wolfe met his final death wound at a long distance, about a quarter of a mile from the spot where he is known to have died, whereas he was not carried in rear more than about 100 yards after he fell, according to various and undoubted authorities, such as the Grenadiers who supported and carried him to the rear. (James Henderson and others.)

(*b*) As the fighting was continued by the resistance of the 1500 Canadian sharpshooters in the intervening copice, who exerted themselves at this instant with more than common ardour (Entick 4, p. 119), it is hardly possible that Wolfe, having passed beyond that point, could have been safely carried back to such a long distance without eminent danger and severe contest, in which case some mention of it would be found in some of the writers.

(*c*) The two mortal wounds of Wolfe did not permit carrying him at such distance, he was in the agonies of death and expired soon after the last shot he had received.

"He first received a ball through his wrist, which immediately wrapping up, he went on with the same alacrity, animating his troops by precept and example. But in a few minutes after, a second ball, through his body, an inch below the navel, and a third, just above his right breast, obliged him to be carried off a small distance in the rear, where roused from fainting in the last agonies by the sound of 'they run;' he eagerly asked, 'Who run?' and being told the French, and that they were defeated, he said: 'Then I thank God; I die contented,' and almost instantly expired." (Entick, 4, p. 118, published 1763.)

But what is most singular is that Mr. Doughty (p. 407), contradicts his plan and confirms Entick as follows:

"During this interval, however, that is between the time of firing, when Wolfe received his wound, and the time when the pursuit commenced, Wolfe was on the spot where he died. It was after he had been

wounded; after he had been carrid to the rear of the front line, and while lying upon the ground, that he was told that the enemy was giving way. It is, therefore, apparent that he must have fallen very near to the place where the firing occurred."

If so, how comes it that on this plan A, General Wolfe is made to advance and fall on the Grande-Allee, about 70 feet from the Western gable of the Female Orphan Asylum, that is to say, nearly a quarter of a mile from the spot where he died. All the ingenuity and figures of Mr. Doughty cannot remove this land mark of the monument, nor the truth of the inscription: "Here died Wolfe Victorious."

Nor can he obliviate the tradition of the fatal spot, marked with reverence by Major Holland, as a meridian stone, on the eminence of the gaol, from whence the fainting hero was carried to breathe his last. (*Bouchette, Description Géographique*, &c., p. 483).

These discrepancies between the text of the writer and the plan he produces to demonstrate the correctness of his contentions, seem to us so palpable, that we venture to assert that the whole of his system being built on such a foundation, it must necessarily make the whole fabric fall to the ground.

Mr. Doughty might easily have had Jefferys' diminutive plan verified by projecting it on a large map of the locality, by means of a negative on glass, on the proper scale, by the magic lantern. It would give him a perspective view, and reproduction mechanically correct and more reliable than any other hand drawing.

Thus he would have been able to follow Jefferys' text so as to comply with his plan and adapt that plan correctly to the ground measurements of to-day.

3. On some other less important points Mr. Doughty continues to be inaccurate and sometimes obscure. It should have been made more clear in what direction he extends the slope of the hill he mentions on plan No. 1. It ought to be toward the river and not towards the town.

Also he might have settled at once the exact position of the "King's mill" and adjoining bakery-house, which were situated opposite the horn-work, (Johnstone, p. 44).

He took considerable trouble to find the distance of a musket shot.

Wolfe himself had marked that distance: "The fire is to begin in a regular manner, when the enemy is within shot, at about two hundred yards." Instructions, etc., 1755, Entic, Vol. IV, p. 93.

4. Another point developed by Mr. Doughty we find altogether novel: It is the probable route taken by the British army in its march

towards the town in files, as indicated on plan No. 1, that is to say, a march straight from the hill of Wolfe's Cove towards the Ste. Foye road, in a N. N.-West direction.

(*a*) This march was not possible, being through the woods of Sillery.

(*b*) It had no immediate object, not tending towards the town.

(*c*) There were two branch roads at hand leading directly to the level ground chosen by Wolfe on the plains. The lower road was good and convenient. (Knox, p. 78).

(*d*) That direction north is flatly contradicted by the text (p. 371), cited by Mr. Doughty, from Knox, which is east towards the town.

"Here we formed again, the river and the south country to our rear, our right extending towards the town, our left to Sillery, and halted a few minutes."

"We then faced to the right, and marched towards the town by files, till we came to the Plains of Abraham, an even piece of ground, which Mr. Wolfe had made choice of, while we stood forming upon the hill."

We shall leave Mr. Doughty losing his way north in the woods of Sillery, and follow Wolfe, arriving on the plains by the direct road he had in mind to take, and from thence gaining the Ste. Foye road with part of his troops, who marched there unopposed.

5. So intent is Mr. Doughty of confining the battle between De Salaberry street and the walls of the town, that he disbelieves or misapprehends the relation of the nuns of the General Hospital, when they say: "Nous vîmes de nos fenêtres ce massacre," and again, "L'ennemi maître de la campagne à deux pas de nous." (p. 391).

From personal observation he says no troops could be seen from thence, who were on the level ground (meaning on the heights). But the Journal of the Nuns here refers to the pursuit by the English as far as the hospital and the bridge of boats, where, in fact, the brunt of battle took place, and where the Highlanders lost so heavily. This locality was part of the field of battle, so much so, says Mr. Doughty (p. 389), that such of the enemy as were wounded that day, and lay there, were made prisoners, the hospital being considered a part of the field of battle."

6. Mr. Doughty places Borgia's house at 100 yards east of Maple avenue, on the Ste. Foye road. Since the English were repulsed from it and that house set on fire by the French, causing their enemy to retreat to their former position, that position necessarily must have been some 100 yards at least west of Maple avenue, and therefore, in line with the race-course.

7. Again he is in error when he takes upon himself to place the four gun battery, as recorded by Hawkins, at the redoubt (Plan No. 1), marked by Major Holland on the eminence to command the St. Lewis and Ste. Foye roads.

Hawkins did not fall into this mistake. He says, p. 344: "The first care of General Wolfe was to capture the four gun battery on the left of the English, which was accomplished by General Howe." Thus the Samos battery is disposed of. So far there is no discrepancy with Mr. Doughty.

But Hawkins (p. 354) mistook the remains of the battery near the race stand as existing on the 13th September, 1759, and as it appears on the plan published by him in 1841, which contains the works, etc., made on the Plains after the battle. But on the accompanying plan of the details of the battle this error is corrected and no redoubt is to be seen there.

The subsequent redoubt was mounted, as it was believed, with the four guns captured from the Samos battery. Mr. Doughty will admit his misapprehension of Hawkins and charge the latter so far as he was mistaken on a minor point, whilst "The Picture of Quebec," he admits, "is an exceedingly interesting work, and by a great many is accepted as an authority of the highest order." (P. 397.)

Mr. Doughty will pardon me in saying he is a newcomer to this country and we welcome his accession among us. But he ignores our early traditions, and we shall continue to hold, as transmitted to us by our ancestors, that the spot where Wolfe received the fatal wound was marked by Major Holland at the corner of the redoubt, called "Wolfe's Redoubt," built on the eminence of the gaol, immediately after the battle of the Plains; and that he expired at the short distance in the hollow where now stands his monument, distant only 75 yards from the race-course.

Let me give him the names of a few witnesses serving under him, who survived the immortal hero many and many years after the conquest, such as the venerable Mr. James Thompson, who died in 1830, at the ripe age of 98 years; Major Samuel Holland, who survived till 1802; Malcolm Fraser, of the 78th, till 1815; Simon Fraser, captain in the same regiment, till 1812; and on the French side, Dr. P. Badelard, till 1802; and a number of Canadian militiamen, among others the grandfather of Garneau, our historian; the father of the Hon. Elie Gingras, M.L.C., who, at the age of 19, was serving under Montcalm; both of whom transmitted directly to these their descendants faithful relations of the war.

It is hard to be told that we have all been woefully in error for the last hundred years as to the site of the battle, and that the square

space of ground called the race-course could not have been trodden by any soldier on that day.

Nevertheless Mr. Doughty asserts that the Third Battalion of the Royal Americans was detached to the ground of Marchmont and occupied the whereabouts of the present buildings to preserve the communication with the beach and the boats. This, he adds, proves that the line of battle was not in the immediate vicinity of the Marchmont property. The inference is not to be so lightly drawn. The true reason is affixed and precedes: it was because "the two armies moved a little nearer to each other," and the Third Battalion, which had been left to guard the landing, was detached from there at that time for the purpose. Mante, (not Manthe), p. 255.

This indicates that the line was not then far away and that this battalion formed part of the rear guard as well, in case of a possible retreat. More than that, the communication thus secured between this rear and the front line and advanced outposts cannot but be considered otherwise than covering the field of battle from Marchmont towards the town on a space hardly more than half a mile.

How Wolfe could avoid trespassing on the race course, when two roads were leading and joining through it, and not take advantage of the shortest cut before him, we are at a loss to understand. It would have been impossible for him to form his right wing near the cliff and reserve behind without utilizing a part of it, the more so as he rested this wing on the lower road.

But without going outside of my own family tradition, I may inform Mr. Doughty that the three brothers Duperron, Louis and François Bâby, my great-grand-uncles, served during the whole of the seven years war, down to the capitulation of Montreal. François, then 26 years of age, survived to October, 1820, and was a contemporary of and in immediate contact with my mother, Elizabeth Anne Bâby, his grand-niece, born in 1803, and who died at Quebec at the ripe age of 86 years. From that source she was possessed of many incidents and details of the war.

On the other hand she knew Marguerite Cassault, wife of Jean-François Casgrain, my great-grandfather. This old lady had lived 25 years under the old *régime*, and had been an eye-witness at Château-Richer, her native place, of the devastation and burning of all the surrounding country by Wolfe, as also of the shelling and destruction of her home in Champlain street. Let me add further that this Jean-François Casgrain, her husband, born in 1716, was present at Fontenoy, 11th May, 1745, and was serving then in the "Carabineers," surnamed "Les Invincibles;" and these, together with the *Brigade Irlandaise,* as is well known, retrieved the day which had been nearly lost. Wolfe, then a young lieutenant of 18 years of age, was in the opposite ranks, though not on the field

that day, but soon after they met at Lawfeldt, to meet again at the siege of Quebec in 1759, where Casgrain, though lame from former wounds, still served the Lower Town batteries against the English fleet. He died in 1802, very near completing his 86 years. If therefore, personally, I rely with some degree of confidence upon the veracity of the persons alluded to, who were well acquainted with the men and events of their times, in a comparatively limited community, Mr. Doughty will allow me, with all due respect for his attainments, to differ from him, and retain my old cherished ideas on both battles of the Plains of Abraham.

So far we have confined ourselves exclusively to the review of this monograph, in pointing out Doughty vs. Doughty. It would require a more complete criticism by comparing him with the divers writers on the subject, weighing each authority and the whole of them in a true scale, and not taking approximate estimates of distances as correct or convenient data. A careful and studious writer might do this with the view of adding valuable and precise information to one of the most salient points in Canadian history.

Note.—This appendix is not intended to form part of the above notes, nor presented in violation of the rule as to printed documents,—but simply to spare the reader's time and trouble in referring to the files of the *Quebec Morning Chronicle*, in order to ascertain the date and nature of the objections raised and published against some of Mr. Doughty's views and statements.

VIII.—*Intrusive Ethnological Types in Rupert's Land.*

By REV. DR. G. BRYCE.

(Read May 19, 1903.)

The filling up of the great north and west of Canada at the present time, by immigrants from all parts of the world, suggests to students of race an inquiry into the early intrusions of ethnological types into Rupert's Land, which became a part of Canada in 1870.

The region known from the incorporation of the Hudson's Bay Company in 1670 until 1870 as Rupert's Land, was the centre of attraction, (1) for several tribes of Indians; (2) later, for bands of traders, settlers and colonists of different nationalities. While at present it is the agricultural and pastoral features of this region that are drawing to it thousands to settle, yet for two centuries before the Northwest became a part of Canada, fur-bearing animals, including on the prairies mighty herds of buffaloes, attracted different races and peoples to the land.

Rupert's Land as defined by the charter of the Hudson's Bay Company, included the lands lying on the rivers and other bodies of water tributary to Hudson Bay. This vast region of varying physical features was divided into two parts by a line drawn from the intersection of parallel 90° W. long. with the north shore line of Lake Superior, running west and northwestward to Lake of the Woods, thence to Lake Winnipeg, up its eastern shore, and far away to the Arctic sea. East of this line is the rocky region, with its Laurentian and Huronian rocks, woods and crystal streams even to Labrador. West of the line lie the wide fertile prairies, generally treeless, covered with rich grasses, and originally inhabited by the buffalo, bear, and antelope. Eastern and Western Rupert's Land appealed in very different ways to the various classes of intruders who were drawn to them.

EARLY RACES.

When the French explorer, Nicolet, first of white men, in 1634, found his way westward, he passed up the Ottawa, down the streams to Georgian Bay, and through that bay, encountering Indians of Algonquin stock. These were the Ottawas, Pottawottomies, and Ojibways. Among these three tribes a confederacy existed known as the "Three Fires." When Nicolet reached the St. Mary river, and at the head of it Sault Ste. Marie, he found the Indians to be still Ojibway, a lead-

ing stirps of the Algonquins. The local name given by the French to the Indians of the district was

SAUTEURS.

Different forms of the word have been used, as:—Saulteurs, Saulteux, Sauteux, or more commonly, Saulteaux. This family of Indians had very marked features of life and behaviour. They might well be called the Indian gypsies of the west.

Bourgainville in his Memoir (1757) tells us that he found numbers of this tribe trading far up Lake Superior at Nepigon. He says: "This tribe, one of the most numerous in these regions, is wandering, plants nothing, and subsists solely by the chase and fishing." As far west as the Kaministiquia river he found Saulteaux, and they were an aggressive and intrusive race, with their faces set westward.

In 1808 Alexander Henry, Jr., found Saulteaux mingling with the Crees on the south branch of the Saskatchewan, fifteen hundred miles west of Sault Ste. Marie. They had there actually become adapted to the use of horses — a remarkable thing for a canoe-loving Algonquin.

A celebrated fur trader, Peter Grant, in 1804, writes a finished and accurate account of the "Sauteux Indians." This sketch is to be found in Ex-Governor Masson's "Bourgeois du Nord-Ouest." He describes the Saulteux Indians, in the main, as follows:

Of common stature.
Somewhat slender.
Complexion, whitish copper-coloured.
Hair: black, long and strong.
Point of nose slightly flattened.
Lips, full.
Cheeks, high and prominent.
Eyes, black.
Face — rather handsome.

The Saulteaux were well adapted by their nomadic life for the life in the rockland forest, and here their influence was strongly felt. Grant speaks of their country as bounded on the northeast by Nipissing (and Hudson's Bay?); on the southwest by the south side of Lake Superior, in a line to the head of the Mississippi, and from thence to Red River. He states their population to be 6,000 souls. (Probably Grant did not distinguish very clearly the Saulteaux from the Crees.—G. B.).

Groups of Saulteaux are to this day to be found on the Red and Assiniboine rivers, and even on the Saskatchewan.

In considering the Saulteaux it is not to be forgotten that it was among those Indians at Sault Ste. Marie that H. R. Schoolcraft collected his immense store of Indian legend, from which Longfellow obtained the material of "Hiawatha."

THE CREES.

But long before the Saulteaux developed in numbers and power, the Ojibways of the Upper Lakes had spread themselves to the north and west. Indeed, the migration noted by the early French explorers from Sault Ste. Marie, was but one of the movements which had been going on probably for many centuries before. The earlier Ojibway migrations had given rise to a vast nation, of several divisions, known as the Crees. Their name was variously spelt by the early writers: Christineaux, Kristinos, Klistinos, Kinistineaux, Knistinos, etc.

I.

Leaving Lake Superior and Lake Winnipeg and going northeastward the rivers and lakes are found to supply food, and the forests to provide hunting for a scattered tribe called the Muskegons or Maskegons. This type is stout, low-set, dark, and somewhat stolid in appearance. The women generally incline, especially in more advanced years, to obesity. They are familiarly known as the Swamp or Swampy Crees, from their country being largely made up of swamp or muskeg. Not only do the Swampy Crees extend to Hudson Bay, but they are found as a persistent type in Labrador, reaching up till they meet the Eskimos, with whom they are at deadly enmity.

II.

While the Ojibways hold the Lake of the Woods district, and are found at Red Lake and other Indian settlements in Northwestern Minnesota, they do not seem to have spread westward, past the Red River and Lake Winnipeg region. The Crees, however, have pushed beyond this district, and are found among the forests of the Winnipegoosis and Lower Saskatchewan. Their habits not having changed from those of the Lake Superior and Lake Huron Indians, they resemble the ordinary Wood Indian. They were called by the French "Les Cris de bois," and now as wandering bands are known as the Wood Crees.

III.

By far the most interesting branch of the Cree stock are the Plain Crees of the English, or "Les Cris de prairies" of the French. The Plain Crees are stalwart, brave, reckless, fond of horse-racing and gambling, but have many noble qualities, being true, and less revengeful and cruel than the Sioux. Finding the necessity of changing their habits to become residents of the prairie, their fathers forsook the canoe and the bark wigwam, and adapted themselves to transport by the horse, and to residence in skin or leather tents. The horse had been brought by the western bands of Indians from Mexico, where it was introduced by the Spaniards, and became invaluable for crossing the wide plains of the west. The Wood Cree or Ojibway had become accustomed to the use of the train-dog, or Huskie (a corruption of Eskie, being a wolfish-looking strong dog used by the Eskimos). With this the Indian could cross the lakes in winter or follow the river, but the dog cannot compare in efficiency with the horse. That this is the proper genesis of the horse-using habit of the Plain Cree is shown by the Plain Cree word for horse, viz.: "Mis-ta-tim," or "big dog." The buffalo was the great object of attraction on the prairies. The Indians of the buffalo country were always in plenty. The Indian women, used in tanning the dung of birds and the astringent bark of the willow, and so succeeded in making excellent leather. Thus the skins of buffalo and deer were tanned for making tent leather, a more suitable, and more durable material for the "tee-pee" or tent than birch-bark could have been. The camps of the Plain Crees were large, and the great chiefs were possessed of a great wealth of horses, tents and guns. The chief means of transport on their horses was by means of the "travoie" or crossed poles over the backs of horses, the lower ends trailing on the ground. The squaws, who were expert riders, managed the whole "transportation question." The Athabasca Crees resembled the Plain Crees, though somewhat modified by their northern habitat.

LINGUISTICS.

The question of language is too large to be discussed at any length in this paper. The Ojibways, including their sub-family of Saulteaux, and the three subdivisions of Swampy, Wood, and Plain Crees, all speak the same Algonquin tongue. Yet the very considerable differences show the length of time that must have elapsed since the forward wave of the Swampy Crees left the homes of the Algic (adjective for Algonquin) nation on the north shore of the Great Lakes. It is said

that shades of difference in pronunciation can be detected among the Swampy Crees, every hundred miles from Lake Winnipeg to the shores of Hudson Bay. The use of different consonantal equivalents is very marked, although care must be taken to examine the nationality, whether French or English, of the lexicographer who has reduced the Indian language to the written form. For example, Lake Winnipeg was first written by the French *Ouinipique*; and by the English on Hudson Bay *Winipic*. Christeneaux was the earlier spelling of the name for the Crees by the French, Cristinos by the English. The following table will be sufficient to show the modification of the consonantal sounds of the same word by different branches of Crees. It is the three persons of the personal pronouns, as given by Father Lacombe:

	I	*Thou*	*He*
Saulteaux (Ojibway)	nin	kin	win
Muskegons (Swampy Crees)	nina	kina	wina
Wood Crees	nila	kila	wila
Plain Crees	niya	kiya	wiya
Athabasca Crees (Far North)	nira	kira	wira

It will thus be seen that marked peculiarities are found in the Algic races and languages, and that certain physical differences may be made out among the different types. No mention has been made of the Blackfeet and allied nations living near the foothills of the Rocky Mountains. They seem ethnologically and to some extent linguistically related to the Crees, but the relationship is too vague to be considered at present.

THE SIOUX INTRUDERS.

The various Algonquin tribes have for centuries been at war with the tall, handsome and athletic Indians living on their southern borders, viz., the Iroquois on the Ohio river, and the Sioux or Dakotas on the Mississippi. The most feasible theory as to these neighbours of the Algonquins is that they came northward in a whirlwind of fury up the Mississippi from Mexico, and are probably of Aztec relationship. Certainly the physical appearance and mental characteristics of the Iroquois and Sioux suggest that they are the same people. Their languages, it is stated, are cognate, and their organization in political confederacies is similar.

The first meeting of the Sioux with the French is chronicled by the early French explorers early in the seventeenth century. At that time the country of the Sioux extended to the west side of Lake Michigan, and this aggressive race virtually controlled Michilimakinac, so long a meeting place of the Indian nations. But the Ojibway

nations—the Ottawas, Pottawattomies, and Saulteaux early obtained firearms from the French, and with these improved weapons drove the Sioux westward, wresting Michigan, Wisconsin, and what is now north-eastern Minnesota from their hereditary enemies. The Saulteaux or other Ojibways have to this day kept possession of the region about Red Lake, Minnesota. The name *Sioux* was first used by the French, being the last syllable of the name Nadouessi — the people — with a French termination added. The confederacy of the Sioux supplied the name Dakotas — or Allies. How grim such a name sounds, when one reflects that even before the arrival of the whites a schism had taken place, seemingly about 1600, by which the northern tribe of the Dakotas broke off from their strong confederacy. From time to time the Sioux made dashes into the Red River and Lake of the Woods country, but were invariably driven back by their Cree or Ojibway neighbours. The massacre of one of the sons of Vérandrye, in 1737, took place on one of these forays. To this day the Sioux war road is pointed out on the west side of the Lake of the Woods; and in Manitoba the Missouri trail from the country of the Dakotas was known to the early settlers.

THE ASSINIBOINES.

As already mentioned these were a seceding tribe from the Sioux Alliance. Their name is Cree, meaning the Sioux (Bwan) from the Stony River (Assin—a stone). They were familiarly known as the "Stoneys" or "Stonies." It is quite possible that the Stony river referred to in their name is that of the Upper Red River, rising in Northern Minnesota from Lake Traverse—a stony lake. The Assiniboines have always been on friendly terms with the Plain Crees, have largely married and intermingled with them, and it is not surprising that the western tributary of the Red River—the Assiniboine—bears their name. The Assiniboine is in appearance a finer Indian than the Saulteau or Cree. He is tall, refined, sharp-featured, and generally much less robust than his northern neighbour. Alexander Henry, Jr. (Coues' edition) gives a good account of the Assiniboines found by him along the Saskatchewan river. The habitat of the Assiniboines, however, was on the Upper Red river, on the Moose mountain, along the International boundary, and even into the Rocky Mountains, west of Calgary. It is not unlikely that the Sioux with whom Lord Selkirk made treaty in common with the Crees and Saulteaux may have belonged to the Assiniboine tribe. Of weaker constitution than their Cree allies the Assiniboines of to-day are a sickly race, and promise soon to be a mere reminiscence of the past.

THE REFUGEE SIOUX.

Though the Sioux war parties were, as we have seen, in the habit of making raids into Rupert's Land, or sometimes trading visits, yet their country was the region of the Missouri river, though it extended through what is now South Dakota, and Southwestern Minnesota. In the year 1862, goaded on to desperation by greedy government agents, the Sioux rose in rebellion against the American government, made a great massacre of the white settlers, and many of those most implicated in the rising fled for refuge to Rupert's Land. A few survivors of the blood-thirsty refugees, and the children of the band, still remain on British soil, at Portage La Prairie, Brandon, Prince Albert and elsewhere. The greater number of the Manitoba Sioux live on the reserves of Birtle and Oak River, north of Griswold. These refugees, now largely settled on reserves, are generally good farmers and sustain themselves, being as aliens unable to receive any grant from the government as the Canadian Indians of Manitoba and the Territories do.

CONDITION OF THE INDIANS.

It is a matter of some importance to state in a few words the present condition of the Indians of the old region of Rupert's Land. An enormous advance has been made in their conditions and prospects since Rupert's Land became a part of Canada in 1870—one-third of a century ago. In almost all parts of this vast region the Indian has become stationary and not nomadic. In many cases reserves have been made, and the great mass of the Canadian Indians live in houses of their own. While hunting and fishing are still favourite occupations with them, yet large numbers of the Indians are farmers to-day. Schools are very generally maintained among them by the Dominion Government, and industrial schools supported by the government under the direction of the different religious denominations are doing a most excellent work among the Indian youth.

For many years before Confederation the different churches carried on missionary work among the Indians, but in the last generation this has been greatly stimulated and to-day there is scarcely an Indian settlement of any size without its missionary, and there are many congregations among the Indians as comely and decorous as those of their white neighbours.

THE METIS.

The Metis or French half-breeds, earlier known as the Boisbrulés, a name which signifies the dark or charcoal-faced people, are on the father's side the descendants of an energetic race which invaded Rupert's Land. The Scottish Fur Company of Montreal, virtually begun by Alex. Henry, sr. (1760), Thos. Curry (1766), Jas. Finlay, (1768), carried on their trade by means of sturdy and venturesome French-Canadian voyageurs from the banks of the St. Lawrence. It is somewhat surprising that these first traders after the conquest of 1759, found no tribe of French natives in the borders of Rupert's Land. Under British rule it became different, and it is even said that the traders encouraged the marriage of a certain number of their men with the Indian women for the purpose of retaining them in their service in the country. Whether this statement be correct or not it is certain that the Metis or Boisbrulé became a well marked type in Rupert's Land. At the beginning of the 19th century, so decided had become the feeling of kinship and common interest that the Boisbrulés spoke of themselves as "The New Nation." No doubt this feeling was encouraged by their leaders, the Nor'westers to stir them up against their rivals of the Hudson's Bay Company. The Metis are as a rule :

Tall,
Active,
Athletic,
Excitable and restless,
Good-hearted,
Brave,
Fond of amusement,
Fond of show.

Their residence was along the Red River, in the parishes, beginning at Fort Garry, St. Boniface, St. Vital, St. Norbert, Ste. Agathe, Point-de-Chênes and Lorette; on the Assiniboine river, St. Charles, St. François-Xavier, Baie de St. Paul; and on Lake Manitoba, St. Laurent. Far away in the West, on the Saskatchewan, the Metis now have their comfortable settlements and live their characteristic life. Their attack on Fort Douglas, in 1816, gave them a reputation for turbulence, which again showed itself in the rebellions of 1849, 1869, 1885. The number of Metis west of Lake Superior, when Rupert's Land was merged into Canada in 1870, probably reached 6,000 souls.

THE ENGLISH HALF-BREEDS.

The fact that from the beginning of its existence in 1669, to the present day, the Hudson's Bay Company's vessel from the Thames has gone northward by the German Ocean and passed through Pentland Frith accounts for the employment of Orkneymen in the service of the company. Stromness was often the last port of call, and early in the 18th century, it is known that Orkneymen went to York and Churchill Factories in considerable numbers. So early as 1775, Alexander Henry, sr., found Orkneymen in the company's service at Fort Cumberland. So largely did this element preponderate in the service, that in 1816 we find the Boisbrulés speaking of the people of the company as "Les Orcanais." The Orkneymen largely intermarried with the Indian women in different parts of Rupert's Land, and usually on leaving the service settled near Fort Garry. Hence the so-called English half-breeds, were only known as such on account of their language, but locally were usually called "Scotch half-breeds." The English half-breeds were:—

Middle-sized or under,
Steadier than the Metis,
Somewhat slow in movement,
Stolid,
Fairly reliable,
Sociable,
Somewhat suspicious,
Intelligent.

The names occurring among this people of mixed blood, are Inkster, Tait, Fobister, Setter, Harper, Mowat, Omand, Flett, Linklater, Spence, Monkman, Isbister, Norquay, and so on. At the time of the transfer of Rupert's Land to Canada, they numbered upwards of 5,000, settled in the parishes of St. Johns, St. Paul, St. Andrews and St. Clements, on the Red River, and in St. James, Headingly, and Portage La Prairie, on the Assiniboine River.

OLD SETTLERS.

The officers of the Hudson's Bay Company, a few traders, but especially the Selkirk Colonists of 1812-15, made up another element in the settlers in Rupert's Land numbering at the time of the transfer some 2,000 souls. While many of the company's traders married half-breed women, the Selkirk Scotch settlers remained for nearly two generations almost entirely separate from the native people. This was partly on account of a strong sentiment on their part, but also because

they were segregated as a people in the parish of Kildonan, which differed in faith from the other English parishes. Among the Hudson's Bay officers, sixty-five per cent were Scotch, and notable names among them were Pruden, Bird, Burns, Stewart, Lillie, Campbell, Christie, Kennedy, Heron, Ross, Murray, Mackenzie, Hardisty, Graham, McTavish, Bannatyne, Cowan, Rowand, Sinclair, Sutherland, Finlayson, Smith, Balsillie, Hargrave and others. The people of Kildonan bore the ordinary Highland names.

CONCLUSION.

Some 50,000 Indians still remain in the old limits of Rupert's Land. The original settlers of Rupert's Land have now been overwhelmed by hundreds of thousands of new comers, and the old life of Rupert's Land has gone never to return. Along with the new settlers, younger Kildonan has spread itself out into Springfield, Sunnyside, Millbrook, Grassmere, Brant and Argyle, and elsewhere; a Metis overflow has taken place to St. Albert, Batoche, and Qu'Appelle and to many a lonely lake and river in the Northwest Territories; the English half-breed has in many cases hurried west to Edmonton, Prince Albert and Battleford to find a home like to that of his fathers on Red River; and the Saulteaux on St. Peters, on Red River, the Crees and Assiniboines on numerous reserves scattered over the plains are becoming less picturesque but more civilized and comfortable; Ojibways and Swampy Crees are still holding their settlements on the Laurentian belt, making a living by fishing, hunting, and labouring for the white settlers and lumbermen.

It will never be quite appreciated by those from abroad who have come to the western province and territories, how much they owe to those who preceded them in old Rupert's Land. That earlier occupation meant the occupation of the land by Indian hunter and English and Canadian fur trader. In time by a slow but sure process came the gradual introduction of Christianity and the attainment of a semi-civilization; thus the barbarous and wandering life of the savages grew into habits of order and settled work. By this means a valuable pioneering and trading agency was provided for the fur trade, for surveying the plains and for Canadian exploration. This early occupation by the whites gave us the nucleus of our present educational and religious organization. These influences made the Hudson's Bay Company not only a band of traders, but a company which helped forward in different lines the improvement of the Indians, and led them to be the friends of education and religion. If the writer reads the story aright, all this conduced to save to Britain and Canada the vast northwest which would otherwise not unlikely have met the fate of Oregon.

IX.—*The Second Legislature of Upper Canada.—1796-1800.*[1]

By C. C. JAMES, M.A., Toronto.

(Communicated by W. Wilfred Campbell and read May 19, 1903).

The fifth and last session of the First Legislature of Upper Canada began at Newark (Niagara), on the 16th of May, 1796, and closed on the 3rd of June. The four years' life provided by the Constitutional Act was thus filled, as the first election took place in August, 1792. Mr. D. W. Smith, in his record of offices, published in my paper of last year, gives 18th August, 1796, as the date of his election; we therefore conclude that the general elections were held in August, just four years after the holding of the first.

Lt.-Governor Simcoe and his advisers had well understood that the evacuation of Fort Niagara by British troops was only a question of time and mutual arrangement and therefore the holding of the Parliament at Newark was but a temporary convenience. The permanent location of the capital therefore was of deep concern and Simcoe's travels through the province were doubtless in great measure for the purpose of selecting points advantageous for towns and government works. The general scheme that he had in view would appear to have been that Kingston, Chatham, Penetanguishene and York were to be naval bases and that the capital should be located in the interior. We are told that he had set his heart upon a site at the Forks of the Thames where a town to be royally named Georgina should arise, to become in time the seat of government. The Governor-General of Canada, Lord Dorchester, did not see eye to eye in all things with Lt.-Governor Simcoe. At length, however, in 1796, the forts were to be handed over to the United States, and hence the importance of moving the capital from Newark. The lands on the north shore were purchased from the Indians in 1787, and in 1788, Mr. Aitkin laid out a town-plot near Fort Toronto, in accordance with instructions from Surveyor-General John Collins. In 1792, Simcoe determined upon York as the name of the county from Durham west, and he gave the name York to the harbour on August 27, 1793.

Simcoe had a very favourable opinion of York, for on a promontory overlooking the valley of the Don he built his rustic house called Castle

[1] This is the second of a series of papers on the Legislature of Upper Canada. The first dealing with the origination of the Legislature and the members of the first Legislature 1792-1796, appeared in the Transactions of the Royal Society of Canada published last year.—C. C. James.

Frank and here he spent the summers of 1794 and 1795. The U. C. *Gazette* of July, 1794, has an advertisement calling for carpenters for buildings at York, whether for legislative purposes or for barracks for the Queen's Rangers, we cannot say. The elections were held in August, and soon after, on 11th September, Simcoe obtained leave of absence. The announcement was made that Peter Russell, Esq., the senior member of the Executive Council, had been appointed administrator under the title of President. This office he filled till 1799, when he was succeeded by Hon. Peter Hunter as Lieut.-Governor. In August, of that year, the latter arrived at York on the Government vessel "The Speedy." In addition to being Lieut.-Governor of Upper Canada, he was Commander-in-Chief of the King's forces in Canada, which necessitated frequent trips to Quebec.

The following are the dates of the four sessions of the second Legislature:—

1st Session, 16th May to 3rd July, 1797.
2nd " 5th June to 5th July, 1798.
3rd " 5th June to 29th June, 1799.
4th " 2nd June to 4th July, 1800.

All these sessions were held at York. I have seen the statement that the third was held at Newark, but the minutes of both the Assembly and the Council bear date at York. The records of the first session are not obtainable. Typewritten copies of the 2nd, 3rd and 4th are available for reference in the Legislative Library, Toronto.

It may be interesting to give the list of returning officers for the second general election :—

Eastern District ....Cornelius Munro.
Leeds and Frontenac, Ontario and Addington, Prince Edward and Adolphustown..Poole England.
Lenox, Hastings and Northumberland .. ....B. Crawford.
2nd, 3rd and 4th Lincolns and Counties of Durham and York.. .....Half pay officer to be recommended by Beasley.
Suffolk, Essex and Kent.. ....Richard Pollard.

The constituencies remained the same as had been fixed by Simcoe's Proclamation of July, 1792. By it the nineteen counties were arranged to elect sixteen representatives and I propose now to give a few notes as to these sixteen members.

Glengarry.—The two brothers, Hugh Macdonell and John Macdonell, had been selected as representatives of the first and second ridings of Glengarry in the First Legislative Assembly. Col. John Macdonell had been Speaker. On the 9th of June, 1798, Col. John Macdonell was sworn in as one of the members for Glengarry, and took his

seat. We thus see that he took his seat at the second session, and a number of questions arise: Was he elected at the time of holding the general elections in August, 1796, and unable to take his seat during the first session? or was some one else elected and the seat vacated through death or by order of the House? The probability is that he was re-elected at the time of the general election, but unable to appear at the first session. Who was the other member for Glengarry, successor to Hugh Macdonell? In the list of members present during the 2nd, 3rd and 4th sessions we find this name continually recurring, Capt. Wilkinson. There were many other members who were military officers, retired officers, but they are not often designated by military title. The conclusion I arrive at is that the Capt. Wilkinson referred to was a captain in active service at the time. We turn to J. A. Macdonell's History of Glengarry, and there find a list of officers of the Glengarry Militia Regiment in 1803, and as captain appears Richard Wilkinson. John Macdonell was colonel and his brother Hugh Macdonell lieut.-colonel of this same regiment. My conclusion then is that Capt. Richard Wilkinson was the member for 1st Glengarry. On the old McNiff map of 1st November, 1786, showing the first settlers, R. Wilkinson, is located on lot 21 of the first concession of Charlottenburg. He was also credited with lots 18 and 19 and the half of lots 17 and 20 in the second concession. The first named lot probably locates his early residence. In the year 1804, Walter Butler Wilkinson was elected as one of the members for Glengarry and Prescott for the Fourth Parliament.

In the year 1800, a bill was introduced into the Legislature for the relief of Hugh Macdonell, "late adjutant-general of the militia." This refers to Capt. Wilkinson's predecessor and the fact of his filling this office referred to may explain why he was not returned a second time as member for first Glengarry.

Dundas.—Col. Thomas Fraser was chosen member for Dundas. He was born in Scotland and came to America. He enlisted first in McAlpine's Corps in which he served as lieutenant. This corps suffered severe loss in Burgoyne's campaign along with Peters' Corps and Jessup's. After the scattered remnants were collected, he joined the Loyal Rangers, commanded by Major Edward Jessup, and was appointed captain of the 10th Company, 22nd June, 1782. He served six and a half years during the war. At the close of the war, the men and officers drew lands in Grenville county. He lived just below Cardinal on the river front near the county boundary line. His record before enlisting is thus entered. "A farmer of property in the Province of New York, lost by the Rebellion." He died in 1821, at which time he must have been well advanced in years. He served through only one parliament,

his successor in the 3rd House being Jacob Weager, one of the Palatine German Loyalists. Mr. A. C. Casselman has called my attention to the fact that his case was that of a non-resident representative. Dundas was settled by Germans. Thomas Fraser lived in Edwardsburgh, on the western limits of Matilda, or just across the line, and his selection was doubtless due largely to the fact that he was a military officer. The Germans served as privates in the 1st Battalion of Sir John Johnson's Royal N. Y. Regiment. Two of their officers had settled in Dundas county, namely Captains Richard Duncan and John Munro. In the year 1788 or 1789 the former was made judge of the Mecklenburg (Eastern) district, and both had been called to the Legislative Council by Lt.-Governor Simcoe, John Munro, on the 17th September, 1792, and Richard Duncan on the 17th June, 1793. Their two leading officers thereby being out of reach, the electors of Dundas felt called to seek a representative military officer outside of their two townships, and so they selected Capt. Thomas Fraser in 1796. Their representative in the first House, Lt. Alexander Campbell was also a non-resident. However, since 1800, the Germans of Dundas have sent many of their descendants as representatives to the legislature.

There were many Frasers among the settlers of the Eastern or Lunenburgh district. The U. E. L. list carries the names of no less than 27 Frasers, six bearing the name Thomas, and eight that of William. Capt. Thomas Fraser, of Edwardsburg, was the member of the legislature. Capt. William Fraser, his brother, also of Jessup's Loyal Rangers, is entered as having residence in the eastern district. Their father, William Fraser, Sr., is also on the list and was living as late as 1786, and probably in 1789, when the list was made up. Some of the Frasers located in the Bay of Quinte district, and it is a fair inference that those that had served in Jessup's Corps were from the same section of New York as Capts. Thomas and William, and were probably relatives. Judge Pringle in his "Lunenburgh," states that Capt. Fraser in 1788, purchased a farm at his own expense for $100, and located upon it a Mr. Clark who had been teaching for two years in the Bay of Quinte district. This Mr. Clark taught the first school in the Fraser district in a log building erected by the settlers. The author does not state which of the two brothers thus early interested himself in the education of the section.

Stormont.—Robert Isaac Dey Gray was elected, and he was also appointed the first solicitor-general for Upper Canada. He was the son of James Gray, major of the First Battalion of the King's Royal Regiment of New York. The father settled near Cornwall at what is known as Gray's Creek. He was born in Scotland, and served in the British

Army for 26 years. James Gray died 11th May, 1796, aged 64, and his wife Elizabeth Gray, died 14th February, 1800, aged 63. They are both buried at Cornwall. The address issued by Robert I. D. Gray to his constituents may be found in Judge Pringle's "Lunenburgh," page 258. It is dated August 3, 1796, and is addressed "To the Free and Independent Electors of the Township of Cornwall and Osnabruck and of the County of Stormont." Col. Clarke, of Niagara, in his memoirs refers to Solicitor-General Gray as being the chief promoter of the bill against slavery. He was one of the charter members of the Law Society of Upper Canada (1797), the first name on the list being that of John White, the first attorney-general, and the second that of Robert Isaac Dey Gray, the first solicitor-general. These two were also chosen Benchers of the Law Society on the 9th November, 1799, (approved 16th January, 1800), and Mr. Gray was treasurer from 1798 to 1801. He was re-elected as member of the third legislature, being chosen for the new constituency of Stormont and Russell in 1800. The election for the fourth legislature was held in 1804, and he was again elected, but he met his fate soon after in that year, being one of the victims in the memorable loss of "The Speedy." His successor as member for Stormont and also as solicitor-general was Mr. D'Arcy Boulton.

When John White, the attorney-general was killed in a duel, January, 1800, he was succeeded by Thomas Scott. The reason why Solicitor-General Gray was not promoted to this position was that it was considered that he was too young.

Grenville.— As already stated Jessup's Loyal Rangers were settled in Edwardsburgh and Augusta, the two townships of Grenville, Colonel Edward Jessup being the leading man of the county. The first American Jessup was Edward, who came from England. His son Joseph died at Montreal in 1779. Joseph's son Edward was born in Stamford, Fairfield county, Connecticut, in 1735. This member of the third generation was evidently a man of influence. He resided at Albany and had at his disposal a large tract north of Albany known as Jessup's Patent. There may be seen on the large map, at the end of Vol. I. of O'Callaghan's Documentary History of New York, two blocks of land bearing the name "E. Jessup & Co.," lying west and southwest of Fort George. This will locate the section of the state in which the Jessups recruited. Fort Edward was near by, the home of Dr. Solomon Jones and his brothers; Saratoga was a little further south; while east of Saratoga was the Cambridge settlement of Irish Palatines whence he drew some members, among whom may be mentioned Lt. John Dulmage. On the U. E. L. list we find Edward Jessup, Esq., major commandant; his son, Edward Jessup; his brother, Capt. Joseph Jessup, and Henry

Jessup. Among the provincial corps organized early in the war were those of Peters, Jessup, and McAlpine. In 1781, after the failure of the Burgoyne expedition, the provincials were reorganized and the corps known as the Loyal Rangers was formed. Major Edward Jessup was given the command. The list of captains was as follows: Ebenezer Jessup, John Peters, Justus Sherwood, Jonathan Jones, William Fraser, John Jones, Peter Drummond, John W. Meyers and Thomas Fraser. The lieutenants were Guisbert Sharp, Henry Simmond, David Jones, James Parrott, Alexander Campbell, David McFall, John Dulmage, Gershom French, Gideon Adams, John Ritter, James Robins, Edward Jessup; ensigns, John Dusenburg, John Peters, Elijah Bolton, Thomas Sherwood, Thomas Mann. Harmonius Best, William Lawson, Conrad Best; adjutant, Matthew Thompson; quarter-master, John Ferguson; surgeon, George Smith, and surgeon's mate, Solomon Jones. A few of these settled in the Bay of Quinté district, most of them in Grenville. Four of the above became members of the legislature. The list is an important one, containing as it does the progenitors of a large number of the most important families of the two sections.

Major Edward Jessup settled on lands in the 1st concession of Augusta, and on his property the town of Prescott was begun. His son, Lieut. Edward Jessup, of the Loyal Rangers, was born at Albany and settled beside his father at what is now Prescott. It was the younger Edward who was elected as member for Grenville in the second legislature. In 1800, on his retirement from this position, he was appointed clerk of the peace for Johnstown district. In 1809, he became lieut.-colonel of the First Regiment of Leeds militia. He died at Prescott in 1815. His father died at the same place, February, 1816.

Edward Jessup, sr., has the distinction of being one of the persons mentioned in the New York Confiscation Act passed 22nd October, 1799, "An Act for the Forfeiture and Sale of the Estates of Persons who have adhered to the enemies of this State, etc."

In the list appear the following : "Robert Leake, Edward Jessup and Ebenezer Jessup, now or late of the said county (Albany), gentlemen."

Robert Leake was major of Sir John Johnson's 2nd Battalion, and Edward Jessup was organizer and commander of Jessup's Corps and the Loyal Rangers.

Leeds and Frontenac.— In the first legislature Ephraim Jones had been member for Grenville. In the second House appears Dr. Solomon Jones, a member of another family, as representative for Leeds and Frontenac. Solomon had been surgeon's mate in Jessup's Loyal Rangers. He was born in Connecticut, and, after studying for his profession

at Albany, had settled with his family in the upper part of the state near Fort Edward on the Hudson. This was Jessup's recruiting ground. The Ephraim Jones family came to Canada via Massachusetts. Solomon and no less than six brothers appear to have enlisted in the Loyalists Corps. Two were killed, one went to Nova Scotia, and four, John, Solomon, David and Daniel, came to Upper Canada. The story of Jane McCrae, who was shot near Fort Edward, comes in as part of the history of this Jones family, for Solomon's brother, David, was her intended husband. Sir Daniel Jones, the first native of Upper Canada to be knighted, was a son of Daniel, the brother of Dr. Solomon Jones. It seems somewhat strange that the member elected for the riding of which Kingston must have formed an important part should have been chosen from the extreme eastern section; but the fact of Solomon Jones being a medical doctor with an extensive practice along the river may be an explanation.

Lennox, Hastings and Northumberland.— After the Bourgoyne failure, the 2nd Battalion of the King's Royal Regiment of New York was formed. Sir John Johnson was lt.-col. commandant of the regiment. James Gray, father of Robert Isaac Dey Gray (see Stormont) was major of the 1st Battalion, and Robert Leake, major of the 2nd. Some of the other officers might be mentioned. In the 1st Battalion : Captains, John Munro, Richard Duncan, Hugh Macdonell, Jacob Farrand, Samuel Anderson, Hugh Munro. In the 2nd Battalion: Captains, George Singleton and William Crawford; lieutenants, Jeremiah French and Hazleton Spencer; and ensign, Timothy Thompson. The 1st Battalion was settled on the St. Lawrence; the 2nd on the Bay of Quinté. The officers named above will all be recognized as leading citizens of the two districts. Hugh Macdonell, Jeremiah French and Hazleton Spencer were elected members of the first legislature. Richard Duncan and Samuel Anderson were appointed among the first judges. John Munro was a legislative councillor. Ensign Timothy Thompson succeeded Hazleton Spencer as the member for Lennox, Hastings and Northumberland in the second legislature. On the list in the Canadian Archives he is returned as having been born in America, served three years, and occupation before the war " private gentleman."

The following sketch of Timothy Thompson was prepared for the author of this paper by the late Mr. Thomas W. Casey, of Napanee. In this sketch he is stated to have married the widow of William Fraser. This William Fraser had been adujtant in the 1st Battalion of the King's Royal Regiment of N.Y., was born in Scotland and served ten years, seven of which were in the 34th Regiment.

So far as I have yet ascertained, Timothy Thompson, a retired officer, under pension allowance, came to South Fredericksburgh at an

early time (the exact date I have not ascertained) and settled on a farm near Conway, P.O., on the Bay of Quinté shore, a couple of lots west of the farm owned by Rev. Robert McDowall, Presbyterian missionary. He was a member of the Church of England, St. Paul's church, Fredericksburgh, and lies buried in the Presbyterian burying-ground just opposite, in a plot near by Rev. Mr. McDowall and family. He was married in St. John church, Bath, by Rev. John Langhorn, February 6th, 1791, to Elizabeth Fraser, widow of the late William Fraser, both of Third Town (see Ontario Historical Society Papers and Records, Vol. 1, page 17). They had no children. He was not married before and therefore left no children.

Mrs. Fraser, his wife, had three daughters, whom he appears to have treated as his own family.

(1) The oldest married John G. Clute, of the same locality, who was a prominent business man then and who lies buried near, beside Thompson. Some of his children are still living. The oldest, Mrs. Murdoch, now of Kingston, is past 90 years, but remembers a good deal. Another, David Clute, Sillsville, P.O., and his sister, Margaret, who never married, also remember a good deal.

(2) Another daughter married James McNabb, M.P.P., of Belleville; a son of theirs was accidentally killed in 1837, mention of which is made in Canniff's History.

(3) Another married — Symons for her first husband; then James Carpenter, of Toronto. Some of the family live there yet.

Timothy Thompson, Mr. Clute says, was several times elected to parliament. One of his opponents was James Mordoff, a resident of Fredericksburgh, whose name appears several times among baptisms and marriages in Langhorn's records. The elections then were held near Thompson's own place, though he did not keep a public house himself, yet, kept "open house" during the several days of these elections, according to the custom then.

Mr. Clute has yet a box on which is painted "Ensign Thompson." Fraser was Scotch and wore his kilties, and he thinks Thompson was also Scotch.

Thompson had a number of negroes, who did all the work and who lived in cabins near by. His widow lived years after him, and the older inhabitants of the locality remember her quite well.

Ellen Clute, a grand-daughter of Thompson's, lived with them, and was adopted as his child. She was made his heir, and there was bequeathed to her the farm. She sold it to Solomon Wright, Esq., where he lived and died, and it is now owned and occupied by his son, Edward Wright. He also willed other lands he then owned or laid claim to. These included a large gore between 1st and 2nd concessions, abutting

across a number of farms of 2nd concession. It is said he got a quit claim deed from government when in parliament. Ellen Clute married Dr. J. B. Ham, a son of Henry Ham. He first practised law in Kingston, with John A. Macdonald or in the same office, then studied medicine and moved to Whitby, where both he and his wife died. There was a long law suit about the gore or gores of land in which a number of Fredericksburgh families were interested, and they spent $3,700 in that way but they held the land, which belongs to their farms till this day.

Addington and Ontario.—Upon the opening of the third session at York, 5th June, 1799, the clerk of the assembly, Mr. Angus Macdonell, read a letter addressed to Hon. D. W. Smith, speaker of the House of Assembly, dated 20th November, 1798, and signed by Robert I. D. Gray and Timothy Thompson, stating that "Christopher Robinson, late a member of the said house, serving as the knight of the shire for the county of Addington, died upon the second day of November."

This locates the first member elected to the second house for Addington and Ontario, and gives us the date of his death, 2nd November, 1798.

This Christopher Robinson was the progenitor of the well-known Robinson family, in Upper Canada, and the name has been perpetuated in many well-known citizens of Toronto, where the first Christopher sat as member in 1797 and 1798. Through the Robinson family of Virginia, he traced back to a family in Yorkshire, England. He was born in 1764. He was an officer in the Queen's Rangers during the revolutionary war and after first going to New Brunswick came to Upper Canada in 1792, doubtless through the influence of Simcoe, the old commander of the Queen's Rangers. He was one of the charter members of the Law Society of Upper Canada (1797). This second legislature held two other charter members, Robert I. D. Gray and Timothy Thompson; and the clerk of the house, Mr. Angus Macdonell was also a member. The first six Benchers were John White, R. I. D. Gray, Walter Roe, Angus Macdonell, James Clark and Christopher Robinson.

In 1784, Mr. Robinson married Esther, daughter of Rev. John Sayre, formerly of Fairfield, Conn. The descendants are fully set forth in Mr. C. E. Chadwick's "Ontarian families," Vol. II, page 57. It might be well to mention that the three sons, Hon. Peter, Sir John Beverly and Hon. William Benjamin were prominent public men in Upper Canada, and the two daughters married D'Arcy Boulton and Stephen Heward, who filled important places. A sketch of the second son, Sir John Beverly Robinson, Bart., may be found in Mr. H. J. Morgan's *Sketches of Celebrated Canadians.* It may be worth noticing that a grandson of the first Christopher is to-day in active practice, at present

engaged as counsel on the Alaskan Boundary Arbitration, Mr. Christopher Robinson, K.C. He is one of the few living grandchildren of the pioneer legislators of Upper Canada.

On the 12th of June, 1799, Messrs. Rogers and Jessup introduced William Fairfield, Esq., as the duly elected member in succession to Mr. Robinson according to the return of Poole England, Esq., returning officer. Wm. Fairfield, sr., is entered on the U. E. L. list as a "pensioner during the war." He was one of the pioneers of Ernestown. He was married before coming to Upper Canada, and nine children accompanied the parents, four of the sons being old enough to be recorded on the U. E. list in 1789. Three children were born in Upper Canada. It was therefore a numerous family, six boys and six girls, all of whom lived to be married. The descendants of William Fairfield, of Ernestown, are therefore a great host at the present day. In 1844, Lt.-Col. John Collins Clark prepared a sketch of the pioneer families of Ernestown and from it I have obtained the following list of the children of William and Abigail Fairfield:—

Archibald, married Mary Howland (from England.)
Mary, married, Ichabod Hawley.
William, married Miss Billings.
Benjamin, married Abigail Lockwood.
Jonathan, married Charity Cryder.
Stephen, married Maria Pruyn.
John, married Elizabeth Clapp (of Fredericksburgh).
Sabra, married William Wilcox (from Augusta).
Abigail, married Henry Ripson.
Clara, married Benjamin Brown (of Brownville, N. Y., brother of Gen. Jacob Brown).
Jennet, married, 1st, John Grashong; 2nd, Daniel Sheldon; 3rd, Arthur Aylesworth (of Hallowell).
Sarah, married Emmanuel Overfield.

William and Sabra Fairfield Wilcox had two children, John and Clara, the latter of whom became the wife of Marshall Spring Bidwell, the well-known representative of Lennox in later years.

Prince Edward and Adolphustown.— One of the memorial tablets on the walls of St. Albans, U. E. L. church, Adolphustown, bears this record:—

"Col. Jas. Rogers, of King's Rangers, died in Fredericksburgh, Sept., 1790, aged 63 years."

The U. E. list bears these three entries:—

"Col. James Rogers, Marysburgh and Sophiasburgh, major commandant."

"James Rogers, Marysburgh and Sophiasburgh, son of Major James, King's Rangers."

"David M. Rogers, Marysburgh and Sophiasburgh, son of Major James, King's Rangers."

Here we have the father, Major James Rogers, of the King's Rangers, and his two sons. There were three daughters, Mary, the eldest, married John Armstrong, from Co. Clare, Ireland. He was for a time private secretary to Governor Simcoe. Their son, James Rogers Armstrong, was the representative for Prince Edward county in the Parliament of Upper Canada (1836), and among the descendants may be mentioned the wives of Rev. Egerton Ryerson, Hon. Wm. Macdougall and Hon. Justice Girouard (see Chadwick's Ontarian Families, Vol. II., pp. 7, 8).

Mary Ann, the second daughter, married Col. John Peters, late sheriff of the Newcastle District, brother of the Bishop of Londonderry.

Margaret married Aaron Greeley, who came from New Hampshire. He was a cousin of Hon. Zaccheus Burnham, of Northumberland county. He erected the first mill at Brighton and there met his wife, as she was then living with her brother, David McGregor Rogers, who had moved west from Prince Edward county. Their daughter, Miss Susan Greeley is now living at Wicklow, Northumberland county, enjoying life at the fine old age of 97 years.

Major James Rogers lived on a farm in Fredericksburgh beside some of his retired King's Rangers. As an officer he drew a large area of land, but most of this had to be selected elsewhere, principally in Prince Edward county. The son, David McGregor Rogers, lived for a time in this latter county and was chosen as representative in the second legislature.

A Scotch-Irish settlement had been formed in New Hampshire and the settlers brought across the sea the name for their new town, Londonderry. With them came their pastor, Rev. David McGregor. The two brothers, Robert and James, were members of this settlement, and the latter married Margaret, the daughter of the Presbyterian pastor, hence the name given to the son, who became the member of the U. C. legislature.

David McGregor Rogers married Sarah Playter, of Toronto, and had four children, two sons and two daughters. The full genealogical record of his family is set forth in Mr. Chadwick's Ontarian Families (Vol. II., pp. 11 to 14). Lt.-Col. H. C. Rogers of Peterborough, Lt.-Col. R. Z. Rogers of Grafton, and Lt.-Col. J. Z. Rogers of Ashburnham are grandsons.

David McGregor Rogers after living some years in Prince Edward county, moved westward into Northumberland county, and finally settled at Grafton, the homestead of the latter place being now in the possession of his grandson, Lt.-Col. Robert Z. Rogers. After the second legislature the province was rearranged for representation and in subsequent parliaments the major represented these districts, of which Northumberland county formed a part. He sat continuously in the house from 1796 to 1824, with the exception of one parliament. He had taken an active part in the military affairs of Upper Canada before, during and even after the war of 1812-14. Having a claim against the province for supplies and equipment incurred through his being commissariat officer, he remained out of the house one parliament, 1816-1820, that he might effect a settlement. Up to the time of his death in 1824, he had sat as member for twenty years. He was the representative man of his district in many ways, judicial, political and civil. He was for some years engaged in superintending the location of settlers over a large area in the Midland district. He was registrar of deeds for the county and appears to have been a representative of his county in more than a political sense. He was born 23rd November 1772, and died 13th July, 1824.

The story of Robert Rogers and the Rogers' Rangers, and of James Rogers and the King's Rangers, may be found set forth in our histories of the Revolutionary War. The Transactions of the Royal Society of Canada for 1900-1901, Vol. VI., section II, contain an interesting paper on "Rogers, Ranger and Loyalist," by Walter Rogers, Esq., barrister of the Inner Temple, London, England, a great-grandson of David McGregor Rogers.

Durham, York and First Lincoln.—The following interesting sketch of Richard Beasley, member for Durham, York and First Lincoln in the second legislative assembly has been kindly contributed by Mr. H. L. Gardiner, of Hamilton:

"Richard Beasley was the patentee of lot six in the broken front and first concession of Barton, of lot 18 in the broken front and first and second concessions, of lot 19 in broken front and first, second and third concessions, and of lot 21 in broken front and first, second, third and fourth concessions, about 1,200 acres in this single township, two-thirds of it now in the city of Hamilton. Smith's 'Canada' mentions that 94,012 acres of the Indian lands on the Grand river were sold to Richard Beasley, James Wilson and John B. Rousseau for £8,887, that the purchase money of this tract had been paid up, and that 3,000 acres had been given to Mr. Beasley to make up a deficiency in the 94,012 acres before mentioned. Much of Mr. Beasley's land was located in Water-

loo township. Mr. J. H. Smith writes that about the year 1785 or 1786 Mr. Richard Beasley, who carried on quite an extensive trade with the Indians, laid claim to the land where Dundurn Park is now situated. He also pre-empted the adjoining property known as Beasley's Hollow, and afterwards erected a mill on the stream flowing into Coote's Paradise. On his monument in the churchyard at Christ's Church Cathedral, Hamilton, the following inscription is found:

"'In memory of Richard Beasley, Esquire, who departed this life on the 16th day of February, 1842, aged 80 years and seven months. The first settler at the Head of the Lake.'

"Mr. Beasley became a member of Barton lodge of freemasons in 1795, and in 1803 the lodge held its meetings in his house, which occupied part of the ground now included in Dundurn Park. J. Ross Robertson's "History of Freemasonry in Canada" says that "an early resident of Barton township, if not the first, was brother Richard Beasley, who was an Englishman by birth. Mrs. John Graves Simcoe knew Mr. Beasley, and made a number of sketches of Burlington Bay and Coote's Paradise. He was not only a mill owner, but storekeeper, and located in Barton township about 1794 or 1795. He traded with the Indians and kept a general store on what is now King street, Hamilton. Brother Richard Beasley was the W. M. of Barton lodge prior to 1810, and wrote a letter to R. W. Bro. Jarvis, dated March 22nd, 1802, concerning masonic and personal matters from which the following extract is taken:

> With regard to your negro woman, she is certainly not worth as much as when you first purchased her; in the first place, she is older and will never make as good servant as what she had been, as she has adopted different ideas from what she formerly possessed. The female child you mentioned worth £30, New York currency, I do not want. I will give you for the negro woman £50, New York currency, if you owe that much to Barry estate shall settle it with your executors. I remain, dear sir, your very humble servant, Richard Beasley.

"Mr. Beasley's house and store were on the north side of King street, west of Ferguson avenue. The building was standing in 1860. It was built of hewn timbers covered with clap-boards. It stood about eight feet back from the present street line. He owned at the same time a house in Dundurn, and his descendants state that Richard Beasley moved to his house at Dundurn immediately after his arrival in Barton, and that his sons, Richard, George, David C., and Henry Beasley, were born in the house and that Henry (the father of Thomas Beasley, city clerk of Hamilton) was born in 1793. Without documentary evidence, it is believed that the first house of Richard Beasley,

the U. E. Loyalist, was at Dundurn, and that his elder sons were born on a house on this site. Thomas Beasley, city clerk; his son, Alexander C. Beasley, and two nephews, Thomas and Maitland Beasley, sons of the late Sylvester Beasley, are the only descendants of Richard Beasley now living in Hamilton, and none of the original property remains in the family."

Second Lincoln. Having settled the representation of 1st Lincoln we come to 2nd, 3rd and 4th Lincoln. With 4th Lincoln was included Norfolk. There are three members to be located, D. W. Smith, Samuel Street and Benjamin Hardison. As Capt. Benjamin Hardison lived at Fort Erie it is fair to assume that he represented 4th Lincoln and Norfolk. Samuel Street's brother lived at Niagara Falls, and was one of the most influential men of that section, and therefore we place him as representative of 3rd Lincoln. Second Lincoln, then, would be left for David William Smith. He had been a member of the first legislature. In my paper last year I attached his name to Kent along with William Macomb. After the paper was in printed pages I was fortunate in securing through Mr. Phileas Gagnon, of Quebec, an extract from *The Quebec Magazine* for December, 1792, containing a list of members, the first printed record as far as known of the members with their respective constituencies. In this list D. W. Smith appears as the member for Essex and Suffolk, while William Macomb and Francis Baby appear as members for Kent. I had based my location of Smith on an extract from a letter by Lt.-Governor Simcoe, in which he states that "Lieut. Smith, the son of Major Smith, who commanded for the last two years at Detroit," had been "elected by the inhabitants of that district into the Assembly." I assumed this settled his election at Detroit, but *The Quebec Magazine* made it very doubtful. Since the Addendum was made to my paper last year I have seen a copy of a very interesting letter by D. W. Smith, referring to the preparations for his election of August, 1792, in which Essex is referred to as the constituency. It would seem, therefore, that the names of Francis Baby and D. W. Smith, of my list published last year should be interchanged.

Mr. D. W. Smith, the surveyor general of lands for the province, with his head office at Newark, was elected on the 18th of August, 1796, as member for 2nd Lincoln. He was chosen speaker to succeed Col. John MacDonnell who was not in attendance at the first session. Mr. Smith was away from Canada when the fourth session opened and as he was not expected home in time, Samuel Street was elected speaker in his stead for the last session.

For further particulars as to the life of Mr. D. W. Smith, readers are referred to my previous paper.

3rd Lincoln.—Samuel Street was elected member for one of the Lincolns and I place him in the 3rd riding. The Street family genealogy may be found in Chadwick's "Ontarian Families," Vol. II., pp. 174-6. The family are there traced back to one Richard Street, who died in Somerset county, England in 1592. There appears always to have been a Samuel in the family and in the Niagara district or old Lincoln county, there were two Samuels that may be confused. Nathaniel Street, of Norwalk, Connec. (born, 1693; died, 1748), had a son Samuel (born, 1720), and the family of the latter consisted of four sons and four daughters. Nehemiah and Samuel were two of the sons. This latter Samuel was the member elected in 1796. The following is Mr. Chadwick's entry:—

"Samuel, born 2nd January, 1752 or 1753, came to Canada 1780 or 1781 (U. E. L.), was a trader at Fort Niagara, col. in the militia (of Canada), J.P., M.L.A., and sometime speaker of the Legislative Assembly; in March, 1784, married Phoebe, daughter of Peter Van Camp and had issue, a daughter Mary, married to John Usher."

Nehemiah the brother settled at Niagara Falls and carried on the business of fur trading and milling. He was succeeded in his business at the Falls by his son Samuel, nephew of the member. He was born the 14th March, 1775, and died 21st August, 1834. This younger Samuel was the progenitor of the Street family of Niagara Falls, among the descendants being Hon. Mr. Justice Street and Rev. Thomas Clark Street Macklem, provost of Trinity University, Toronto. Lt.-Col. Thomas Clark Street, son of Samuel Street, jr., represented Welland county in the Ontario Legislature, 1851-1854, and the latter's sister was the wife of Hon. Josiah Burr Plumb, sometime speaker of the Canadian Senate.

At the opening of the 4th session of the 2nd parliament, Mr. Samuel Street was elected speaker, in the absence of Hon. D. W. Smith. He was speaker for only one session as at the elections after the session Ralfe Clench and Isaac Swazey were returned as the two members for the united ridings 2nd, 3rd and 4th Lincoln.

4th Lincoln and Norfolk.—Capt. Benjamin Hardison, of Fort Erie, was a member of the second parliament, and I attach his name to the united ridings of 4th Lincoln and Norfolk. Lt.-Col. Ernest Cruikshank has directed my attention to the following notes as to his connection with the war of 1812-14, as set forth in "The Documentary History of the Campaigns on the Niagara Frontier."

On the 17th June, 1812, Benjamin Hardison and three others, wrote to the *Buffalo Gazette*, referring to the understanding that Black Rock and Fort Erie were to observe a neutrality towards each other, and calling attention to the fact that recently musket balls have been fired from the American side.

Buffalo, 28th July, 1812: "The British have erected another breastwork in a circular form on the hill near Capt. Hardison's opposite Black Rock. A number of soldiers are stationed behind it."

Buffalo, 1st December, 1812 : "Between 9 and 10 o'clock, three sailors embarked in a boat, passed over to the enemy's shore and set fire to the dwelling house of B. Hardison and to the house and store of Mr. Douglas, which were consumed."

Lt.-Col. Cruikshank has lately interviewed Capt. Hardison's daughter, Mrs. Martha Ann Stanton, who is still living at Fort Erie, aged 86. She states that her father was twenty years older than her mother, who was born in 1781. Her mother was his second wife. He was born, therefore, in 1761. He died about 1823, and is buried on his farm at Fort Erie. The Massachusetts War Records contain the following entry:—

"Benjamin Hardison, private in Capt. Moye's Company, Col. Phinney's regular Massachusetts troops, taken prisoner and held captive in Canada until close of the War."

He was born at Berwick, then in Massachusetts, now in the State of Maine. Mrs. Stanton states that he was an usher to the first Provincial Legislature, Samuel Street being another, and she has a silver knee buckle set with Irish diamonds, which is believed to have been part of his official costume.

Capt. Hardison is the only member of the early Legislature who had fought on the United States side—perhaps his withdrawal from the fighting through his capture and the treatment received while in Canada may have changed his views. He was but a youth at the time. We shall probably never know the reason for his settling at Fort Erie and becoming a loyal Britisher. It is also worth noting that there is still living in 1903 the daughter of one who was employed in the First Legislature of Upper Canada in 1792 to 1796, and who was a member of the Second House one hundred and seven years ago.

Kent.—As in the first parliament, Kent sent two representatives elected jointly by the whole county, not by two ridings of the county as in the case of Glengarry. As stated in the previous paper, Kent county included all left over from the other counties north and west as far as the Indian lands. The southern boundary was a line running east from Maisonville's mill to the Thames. The county included,

therefore, a narrow strip running east from the Detroit along the south shore of Lake St. Clair. This line would begin about where the town of Sandwich now is. Detroit was in the hands of the British up to 1796, and, therefore, it was the headquarters for the first election. This post was evacuated in July and the elections took place in August. The British citizens had removed to Amherstburg and Sandwich. The second general election was doubtless held at Sandwich, and the two representatives chosen were Thomas Smith and Thomas McKee.

Thomas Smith followed the same profession as David William Smith, he was a land surveyor, but the two were not related as far as known. Among the records we find this statement: "Thomas Smith, loyalist, came into Niagara in 1776, with a plan of Fort Stanwix and Intelligence." He settled at Detroit, and in 1789 and 1790 was Secretary to the Hesse Land Board.

In 1790, for some reason, he was displaced as secretary, and was succeeded by D. W. Smith, son of the chairman, Captain John Smith, who was commander of the Detroit forces at the time. In a letter dated 1790, he is referred to as clerk of the court of the District of Hesse, and in 1789 was acting deputy surveyor. That he was a member for Kent in 1797 is proven by the fact that in that year the land board sitting at Newark (Nassau or Home district), had under consideration the petition of Thomas Smith, member for Kent (see Michigan Pioneer and Historical Society, Publications, Vol. XXV, pp. 142, 148). In this petition it is stated that from July, 1776 to April, 1777, he served as a captain in the Indian department. Resigned and served in militia department at Detroit as second in command under Col. McGregor. For two years he was secretary to the land board at Detroit; clerk to His Majesty's Court for three years; employed two and a half years in assisting settlers; served 16th August, 1794 to December 14th, against Wayne. He lost much property. Six hundred acres were granted to his wife as the wife of a member of parliament.

The following letter dated October, 1788, was written by William Robertson, Esquire, to the Chief Justice of Quebec, and supplies some additional information as to Thomas Smith. Mr. Robertson requests to have him appointed a notary for Hesse:

"For this purpose Mr. Thomas Smith has been mentioned with approbation. He is a lieutenant in the militia, acting for the present as deputy surveyor, but without pay or commission, as there is nobody else; has been very judiciously nominated clerk of the Court of Common Pleas there; and from his education and knowledge of the two

languages, and an opinion and confidence the people have of his principles and integrity, I presume his appointment as notary would be satisfactory for these reasons, to which may be added that he is not likely to change his residence or leave the place, being married and settled."

The first three judges of the Court of Common Pleas for the District of Hesse (1788), were Jacques Duperon Baby, Alexander McKee and William Robertson.

Mr. C. M. Burton, of Detroit, has kindly furnished me with some notes as to Thomas Smith.

Finding the surveying business dull, he entered into an agreement with John Askin to carry on business as a trader—an adventure they called it—and he was at Miamis for several years. Some years after 1796, he resided in Detroit, and acted as surveyor. He made a map of Detroit in 1796 and at one time got a large land grant on the U. S. side of the line. A daughter of Thos. Smith married John McDonnell of Detroit, a well-to-do citizen, who at one time made quite a stir in an international dispute. Many of the early western surveys bear Thomas Smith's name. A very interesting map of Sombra township made in 1820 testifies to the neatness of his work. He was a native of Wales and died at Sandwich on the 3rd of March, 1833, aged 79 years.

Thomas McKee the other member for Kent, was a son of Col. Alexander McKee who had been Indian agent at Pittsburg before the Revolutionary War. He was one of the efficient western leaders of Indian forces during the war. He was of Irish birth. After the war he settled on the Detroit river. Thomas McKee, the son, married Therese Askin, the daughter of John Askin, governor of Micilimackinac. The Askins were an Irish branch of the Scottish Erskine family. Alexander McKee, as before stated, was one of the first three judges of the Court of Common Pleas for the District of Hesse. From 1788 to 1796 this court held sessions at Detroit. He was for a time deputy superintendent general of Indian Affairs; Sir John Johnson, with headquarters at Montreal, being superintendent general. Col. McKee died after a short illness on the 14th January, 1799, and was succeeded by Col. Daniel Claus. Thomas McKee who died recently at Sandwich holding the office of registrar of the County of Essex was grandson of Thomas McKee, the member for Kent, elected in 1796. His son William James McKee, of Windsor, represented North Essex in the Legislature of Ontario from 1896 to 1902. Both Col. Alexander McKee and Col. Thomas McKee were influential men among the western Indians and their names are to be found on many of the impor-

tant treaties and land surrenders. For many years he was one of the Indian superintendents. Thomas McKee was one of the members for Essex in the 3rd parliament and was succeeded in the 4th by David Cowan. Though elected at the general elections of August, 1796, he did not take his seat until 1800, being introduced and sworn in as member at the opening of the fourth session. The succession from the first to the last McKee mentioned in this paper is interesting:—

Col. Alexander McKee—Thomas McKee (member 1796)—Alexander McKee—Alexander McKee—Thomas McKee (registrar)—Thomas Alexander McKee and William James McKee (ex-M.P.P.). Thomas McKee, member of the second legislature died in 1815.

Essex and Suffolk.— David William Smith had represented these counties in the first legislature. Just before the first session (August, 1792) he had removed to Newark, and, as stated above, had changed his constituency in 1796, being elected for 3rd Lincoln, in which Newark was situated. This left a vacancy in the west. At the close of the Revolutionary War, Detroit was the chief centre of the western district. Across the Detroit river a French-Canadian settlement had gradually sprung up about the Indian church located at what is now the town of Sandwich. The Indians had granted to a half-dozen of their English-speaking leaders a large tract, now the township of Malden, but the dispute in connection with the ownership of this land was not settled until after the erection of Fort Amherstburg, in 1796, and the removal thither from Detroit of the military and naval headquarters.[1] A large number of loyalists had settled on a strip of land running east from Malden township along Lake Erie. Many of these were members of the disbanded Butler's Rangers. In 1787 Major Matthews, under orders from Lord Dorchester, laid out 97 long, narrow lots and confirmed the squatters in their rights. These formed the first lots of two townships, which, for many years, went by the name "The two connected townships." Their present names are Colchester and Gosfield. The lots were numbered from east to west. In the Government records this section from Kingsville to the eastern boundary of Malden is referred to as "The New Settlement." Lots 68, 69 and 70 were reserved for a town. Colchester village stands on these lots today.

Number 97 was occupied by John Cornwall, and he was the man who was elected in August, 1796, to represent Essex and Suffolk. In 1899 Mr. Thaddeus Smith wrote a pamphlet giving an historical sketch of Pelee Island with an account of the McCormick family. The Chippawa and Ottawa Indians in 1788 gave a lease of the island to Thomas

[1] See Early History of the Town of Amherstburg, by C. C. James. The Echo Printing Company, Amherstburg, 1902.

McKee for 999 years. In 1804 Thomas McKee leased the island to John Askin, and in 1815 Alexander McKee, son of Thomas, leased it to William McCormack. In 1823 full title was passed, and the island's history became part of the history of the McCormick family. William McCormick married Mary, the seventeen-year-old daughter of John Cornwall, in January, 1809, and in this way the sketch of the member under consideration comes into the story. John Cornwall was a native of Wales. He came to America about 1772 and settled in Connecticut. He joined the Loyalists and, after serving through the war, found himself at its close in the western district. On enlisting, "he left his wife and child in Connecticut, and it was twenty (?) years before they joined him in Canada, the son by that time a grown man. This son, Joshua Cornwall, I take to be the member elected to represent Essex county in the seventh parliament, 1817. Mr. Thaddeus Smith has given us more information of Mary Cornwall McCormick than of her father. Her husband died in 1840, and she survived him fifty-one years, dying in 1891, but little short of 99 years of age. "She had good executive ability and great influence for good upon those she came in contact with. Her mind was a wonderful storehouse of knowledge of the incidents and history of the early times, much of which was within her personal experience."

An old record book of "The Two Connected Townships" preserved in the Crown Lands Dept., Toronto, gives the names of the grantees of the 97 lots, John Cornwall is entered as a private of Butler's Rangers. Then follows this note: "The Board told Cornwall that if he could find an unclaimed few lots together, they would consent to his getting them for himself and family and so dispose of his improvements on his lot." Thaddeus Smith states that he lived near Sandwich. The above note may help to reconcile statements as to his location.

Members of First Legislature.

Since the appearance of my paper of last year dealing with the members of the first legislature I have been enabled to procure notes of three members that were somewhat briefly referred to, namely: Isaac Swayzie, member for 3rd Lincoln, Francis Baby, one of the members for Kent and Parshall Terry, member for Lincoln and Norfolk.

Isaac Swayzie.—The following notes as to Isaac Swayzie, member for 3rd Lincoln in the first legislature (1792-1796), have been furnished by Mr. Benjamin E. Swayzie, barrister, of Toronto, great-grandson of Israel Swayzie, the first settler at Beaver Dams, and first cousin of Isaac Swayzie:

Samuel Swayzie from Southold, Long Island, was the progenitor of the New Jersey family. He was born at Southold, 20th March, 1689. He removed to Roxbury, N.J., in 1737, and resided there till his death, 11th May, 1759. His fifth and youngest son was Caleb. Three of the sons of Caleb came to Canada at the end of the war, and three others later on.

1. Isaac, who settled on the Niagara river.

2. Caleb, Jr. (born 27th March, 1772; died 15th June, 1858), who was buried in the old Beaverdams cemetery. He was grandfather of W. D. Swayzie, of Dunnville.

3. Richard (born 5th February, 1775; died 12th January, 1863), who settled near Beaverdams and was the father of the Swayzie families of Haldimand county.

Three other children came to Upper Canada later, namely:

4. Samuel, came to Canada in 1805, and settled at Allanburg.

5. Susan married — Sharp, and settled at Ancaster, where she died, aged 104 years.

6. Elizabeth, who married — Cooper, and lived near Niagara Falls.

Lt.-Col. Isaac Swayzie, described in the official list of U. E. Loyalists, as the "Pilot to the New York Army," made his home at Niagara and appears to have been more or less engaged in active service during the whole of the Civil War, at one time commanding a small fort in New York State. Early in the war, he and a number of unarmed men were occupying an old log house, when a party of armed Whigs suddenly surrounded the place. Knowing that he was the person wanted, he, Isaac, was concealed beneath the floor of the dwelling. The Americans searched the place, and on not finding him, they became enraged and bayonetted his unarmed brother to death. Isaac was lying immediately under the place where his brother was killed and was completely saturated with his blood, eventually escaping by slipping through the guard. Naturally a man of extreme views, this incident so preyed upon his mind that his one object in living seemed to be to do the greatest possible injury to the Americans. He was captured several times, but always succeeded in making his escape, the last time with the assistance of his wife, who shortly afterwards fell a victim either to the savagery of the Indians of New York State, or to the over zeal of some of the "Sons of Liberty." The death of his wife had the effect of increasing his bitterness towards the Whig or Revolutionary party, and he then declared that he would never make peace with them, and apparently they never made peace with him. When the American forces were first encamped on the Swayzie farms near the Beaverdams, they respected property, and left the people in possession of their dwellings. True, they took whatever they wanted,

but they paid cash for whatever was taken by them. Not so with the property of Isaac, they turned his home into a barracks for their men, destroyed his crops and buildings, and did not leave as much as a rail of his fences unburned.

Early in the war Isaac was arrested and imprisoned in the old log jail at Andover, Sussex county, N.J. Provisions were supplied to him by his family, and in a baked loaf his sister concealed a key by which he managed to gain his release. He made his way to New York city and joined the British army, becoming "Pilot of the New York Army."

As mentioned in my previous paper, Col. Isaac Swayzie was the originator of the well-known apple named "Swayzie Pomme Gris." He was the pioneer nurseryman of the Niagara district and carried trees on his back to Beaverdams, where they are still growing on the old Israel Swayzie homestead between The Cross Roads and St. John's West.

According to tradition Isaac was married before coming to Canada, but lost his wife through the terrible doings of the war. He was imprisoned; his wife visited him; they exchanged clothes; he escaped; she was put to death. His second marriage with Sarah Secord, and his third marriage with Elenor Ferris are referred to in my previous paper.

During the Revolutionary war Isaac Swayzie made his name a terror to the enemy, and for years his deeds were the subject of fireside recital in New Jersey. He was distinguished also in the war of 1812-14 as he commanded a corps of fifty men variously known as "The Royal Artillery Drivers," "Swayzie's Militia Artillery," and "The Lincoln Militia Artillery." For his services he received a land grant in East Nissouri, Oxford county.

He sat in the Legislative Assembly of Upper Canada as follows:

1st Parliament (1792 to 1796) for 3rd Lincoln.
3rd Parliament (1801 to 1804) for 2nd, 3rd and 4th Lincoln.
4th Parliament (1805 to 1808) for 2nd, 3rd and 4th Lincoln.
6th Parliament (1812 to 1816) for 4th Lincoln.
7th Parliament (1816 to 1820) for 4th Lincoln.

The following notice appeared in *The Gleaner and Niagara Newspaper* of the 18th February, 1828:

"Died.— At his place of residence near this Town on the 11th instant, Isaac Swayzie, Esq., aged 77 years. Mr. S. was a native of New Jersey. In the general defection of the inhabitants of that Colony at the commencement of the Rebellion that ended in the independence of the now United States he remained true to his King and Country and was persecuted and suffered much by imprisonment and otherwise

as was usual in such cases. He at length escaped into the British lines, we believe, at New York.

"He was actively employed in His Majesty's service till the peace of 1783. He afterwards came into this part of the country where he has resided ever since. Mr. Swayzie has been frequently chosen as a representative in our Commons House of Parliament. A number of years ago he was appointed Collector of the Internal Duties of the District, which duties he faithfully performed with much forbearance to the people from whom moneys were to be received frequently to his own loss."

Francis Baby, member of the First Legislative Assembly for Kent (1792-1796), along with William Macomb, of Detroit, was the ninth child of Hon. Jacques Duperon Baby, the pioneer French Canadian trader at Detroit. He married (9th September, 1795) Frances Abbott, daughter of James Abbott, a British officer, who came to America at the time of the Revolutionary War. James Abbott was a native of Dublin, who came to America, settled first at Albany, and later moved to Detroit where he engaged in the fur trade, having branch houses at Vincennes, Indiana, and other places. His brother, Edward Abbott, was Governor of Vincennes at the time of the Revolution. Among the children of James Abbott were James, judge at Detroit; Mary, wife of Sheriff Hands, of Sandwich, and mother of Mrs. Jean Baptiste Baby; Frances, wife of Francois or Francis Baby, and Elizabeth, wife of Hon. James Baby. Judge James Abbott, just mentioned, married Sarah Whistler, aunt of Whistler, the artist.

Mr. Duncan Dougall, of Windsor, has kindly sent me the following notes in regard to his grandfather, Francis Baby:

"Francois Baby had amongst other lands over 1,000 acres of land in Windsor and Sandwich West, being two farms in width in the present city of Windsor, and running back through three deep concessions, according to the French survey. The original deeds from the French Crown described the lands as running to the centre of the Detroit river, but when the British Patents were issued they were only from the channel bank of the river. Francois Baby was appointed lieutenant of the Western district, which included the counties of Essex, Kent and Lambton, and as such, exercised a sort of governorship similar to the lieutenants of the counties of England.

"He lived in a feudal sort of way and was very proud and, I might say, arrogant. As I remember him when I was a boy 10 years of age, he was a tall man, over six feet high and very straight, with a deep bass voice. I do not think he was in any business, but lived on his money and what was raised on the cleared portions of his estate. He was M.P.P. and was defeated by Col. John Prince.

"The dwelling house in which he lived for very many years before his death is still standing. It was built with a large lawn in front and facing the front on Sandwich Street and the river, but has now been turned into a double house and faces the back street, now Pitt Street. He was very fond of horses, and always kept good ones, and thought nothing of driving down to Quebec and Montreal in his sleigh. On one occasion, when my grandmother was ill, he wanted a Detroit physician, and drove to Detroit on the ice. When he started the ice had shoved and was moving down the ricer, but this did not daunt him. He started across the river, jumping his horse and cutter from one cake of ice to another, and succeeded in landing in Windsor safely. He drove a covered caleche in summer when making long trips and when he came down to visit us at Rosebank, my father's residence (near Amherstburg), which he frequently did, he would usually start for home, a drive of 18 miles, about nine or ten o'clock at night, preferring to make the journey through the night.

"The Battle of Windsor (1837) was fought in the orchard of Francois Baby.

"Jacques Duperon Baby was very friendly with the Indians who deeded to him the large tracts of lands. One tract, just below Detroit on the River Rouge, another above Detroit on Lake St. Clair between that city and Mt. Clemens, and another tract, the largest of all, was 30 miles square on Lake Huron and the River St. Clair. Port Huron and many other towns and villages are now built upon parts of it. After the Declaration of Independence the Babys sided with British and came back to Canada to live, and the land was all forfeited."

The father, Jacques Duperon Baby, lived on a farm where Windsor now stands, and to this home Francis succeeded. Jean Baptiste lived at Sandwich, and Hon. James Baby lived on a farm further east, near Chatham.

Francis Baby was born 7th December, 1763, and died 24th November, 1856; his wife, Frances, died in 1838, aged about 59. There were twelve children.

1. Francis (born 1796, drowned 1828), father of F. R. Baby, of New York, and of Albert F. Baby, of Cameron, Minn.
2. James (born 1798), married Elizabeth Henderson.
3. Elizabeth (born 1800), married Pierre Paul Lacroix.
4. Edmund (born 1803), married Francoise Agatha Arket.
5. Anne (born 1805), married William L. Baby.
6. Emily (born 1807), married Dr. Albert K. Dewson.
7. Henry (died young).
8. Antoine Raymond (born 1811), father of Raymond Baby, banker, of Chatham, now of Windsor.

9. Susanne (born 1814), married James Dougall, of Windsor.
10. Charles Jean (born and died 1816).
11. Alfred (born 1817).
12. Thaddeus (born 1820).

Parshall Terry: The name — Young, as one of the members of the First Legislature, had, for many years, puzzled me, and I was unable to locate the man or his riding until the finding of *The Quebec Magazine* for December, 1792, by Mr. Phileas Gagnon, referred to in my previous paper, set me on the track. The correct name was Parshall Terry. A careless writing of the name "Terry" by Dr. William Canniff, or by some one for him, led him or the compositor to read it "Young," and so it was printed. Subsequent writers followed the wrong name, and the mistake thus came into many books and pamphlets. I got the correction last year just in time to insert it in the final proof, but too late to add any notes.

References to Parshall Terry will be found in the three volumes of "Landmarks of Toronto," by Mr. John Ross Robertson, as follows: Vol. 1, p. 427; Vol. 2, p. 994; Vol. 3, p. 297. He was the only member of his family who sided with the British. He belonged to Butler's Rangers and settled at first at Niagara. He followed Simcoe and the troops to York and settled in the Don Valley. His neighbours were the Eastwood, Skinner and Helliwell families. Terry built mills at the head of Broadview avenue. He married Rhoda Skinner, and had five daughters who married the following persons: Edward William Thomson of Toronto Township, George Thomson of Scarboro, Dr. Lee Loudon, Lt.-Col. Farquharson, and James Cornell of Scarboro. The last of his family died in 1875. After his death his widow married William Cornell. She lived to a great age. Parshall Terry was drowned in July, 1808, while attempting to cross the Don. His pioneer mill on the Don was succeeded by the old paper mill which stood near the bridge that yet carries across the river the old mill road.

ADDENDUM.

Place of Meeting: The mistake has been made more than once of referring one of the sessions of the Second Legislature to Newark or Niagara. There appears to be no doubt whatever as to the places of meeting of the various sessions 1792-1800. The five sessions of the First House were all held at Newark, and the four sessions of the Second House were all held at York. The typewritten copies of the journals, and the earliest printed statutes, confirm this. The little settlement on the west or left bank of the river was variously known as Niagara, West

Niagara, Butlersburg, Lenox, Nassau and Newark. The official name was Newark at the time of the sessions of the First Legislature. Lt.-Gov. Simcoe himself in his proclamation of July, 1792, named the township Newark, after Newark in Lincolnshire, England. Section 12, chapter 8, of the 1792 statutes provided for the erection of a gaol at the "Town of Newark," and section 3 of chapter 6 of the statutes of 1793, provided for sittings of the sessions of the Peace for the Home district at "Newark." The Lieutenant-Governor's proclamations and his announcements, as a rule, were dated from "Navy Hall" or "Council Room, Navy Hall," as though the little group of buildings near the wharf, containing the provincial executive offices, were a place apart from the people's settlement of Niagara or Newark.

The first volume of Upper Canada statutes now available contains the statutes-at-large from 1792 to 1804 inclusive, paged consecutively, set up without break, but bearing on the title page "York, 1802." This date may have been a typographical error, or there may have been an earlier volume printed in 1802, and in the volume 1792-1804, the printer may have repeated the former title page. After the year 1804 the statutes were printed yearly, and our largest libraries contain bound volumes that are made up of statutes of the various years: thus at Osgoode Hall, Toronto, is the compilation 1792-1804 with the title page dated 1802; and in the Ontario Legislative Library are two volumes, one with the statutes for 1805, 1806, 1807 and 1808, bound up with the 1792-1804 collection, and the other having, in addition to the above, the statutes for 1810 and 1811, together with the Imperial statutes affecting Canada from 1774 to 1791.

In the volume 1792-1804 the numbering of the sessions is corrrectly given, except in nine headlines where fourth appears instead of third, but in the volume printed at York in 1818, there is a curious mistake that may mislead some writers. The volume is entitled "The Provincial Statutes Revised, Corrected and Reprinted by Authority, York, 1818." The first, second, third and fourth sessions of the First Parliament are correctly numbered. Then the fifth of the First is called the First of the Second, and so on until we have the fourth session of the Third in 1803, followed by the fourth session of the Third in 1804. The compiler allowed the mistake to stand for the sessions of 1797 to 1803 inclusive. It may be that the pages had already been run off the press when the mistake was corrected in 1804. Type was limited, no doubt, and paper was scarce. The printers' mistake occurred through the fact that there were five sessions during the four years 1792-1796. Thompson and Macfarlane corrected this mistake as to the numbering when they issued their revision of statutes at Kingston in 1831.

In both the York and the Kingston issues the statutes of 1792 and 1793, are stated to have been passed at Niagara, but, as stated above, the typewritten journals are dated at Newark.

Mr. Thomas Langton, K.C., of Toronto, in connection with this matter, has called my attention to the following extract from "The Travels of Isaac Weld (Vol. 2, pp. 87, 88, third edition, 1800), under date of September, 1796. It will be an interesting addition to the history of the little town that was the meeting place of our First Legislature, a place that has enjoyed so many names, its latest, that of "Niagara-on-the-Lake," having been given to its post office in March, 1903:

"On the eastern side of the river is situated the fort, now in the possession of the people of the States, and on the opposite or British side a town most generally known by the name of Niagara, notwithstanding that it has been named Newark by the Legislature. The original name of the town was Niagara; it was afterwards called Lenox. then Nassau, and afterward Newark. It is to be lamented that the Indian names so grand and sonorous should ever have been changed for others. Newark, Kingston, York are poor substitutes for the original names of their respective places—Niagara, Cataraqui, Toronto. The town of Niagara hitherto has been and still is the capital of the Province of Upper Canada. Orders, however, had been issued before our arrival there for the removal of the seat of Government from thence to Toronto, which was deemed a more eligible spot for the meeting of the legislative bodies as being further removed from the frontier of the United States."

Students of Canadian history will find interesting supplements to this paper and to that of 1902 in The Transactions of the Canadian Institute, April, 1892, Vol. II, Part 2. "The Administration of Lieut.-Governor Simcoe viewed in his Official Correspondence," by Ernest Cruikshank.

And in No. 2, Vol. II of University of Toronto Studies, History and Economics; "Municipal Government in Ontario," by Prof. Adam Shortt.

In *The Globe* of 24th October, 1903, will be found a very full and authoritative discussion of the question as to where Parliament first met, by Miss Janet Carnochan, president of the Niagara Historical Society.

The D. W. Smith election letter referred to on page 158, has just been printed in Transaction No. 4 of the Women's Canadian Historical Society of Toronto (1903).

LIST OF MEMBERS OF FIRST AND SECOND LEGISLATURES OF UPPER CANADA — 1792-1796 and 1796-1800.

Glengarry, 1st Riding,	1792-1796, Hugh Macdonell. 1796-1800, Richard Wilkinson.
Glengarry, 2nd Riding,	1792-1796, John Macdonell. 1796-1800, John Macdonell.
Stormont,	1792-1796, Jeremiah French. 1796-1800, Robert I. D. Gray.
Dundas,	1792- Alexander Campbell. 1796-1800, Thomas Fraser.
Grenville,	1792-1796, Ephraim Jones. 1796-1800, Edward Jessup.
Leeds and Frontenac,	1792-1796, John White. 1796-1800, Solomon Jones.
Addington and Ontario,	1792-1796, Joshua Booth. 1796-1798, Christopher Robinson. 1799-1800, William Fairfield.
Prince Edward and Adolphustown,	1792 Philip Dorland. 1793-1796, Peter Vanalstine. 1796-1800, David McGregor Rogers.
Lenox, Hastings and Northumberland,	1792-1796, Hazelton Spencer. 1796-1800, Timothy Thompson.
Durham, York and 1st Lincoln,	1792-1796, Nathaniel Pettit. 1796-1800, Richard Beasley.
2nd Lincoln,	1792-1796, Benjamin Pawling. 1796-1800, David Wm. Smith.
3rd Lincoln,	1792-1796, Isaac Swayzie. 1796-1800, Samuel Street.
4th Lincoln and Norfolk,	1792-1796, Parshall Terry. 1796-1800, Benjamin Hardison.
Essex and Suffolk,	1792-1796, David Wm. Smith. 1796-1800, John Cornwall.
Kent (Two Members),	1792-1796, William Macomb and Francis Baby. 1796-1800, Thomas Smith and Thomas McKee.

X.—*Acadian Magazines.*

By D. R. JACK,

(Communicated by Dr. S. E. Dawson and read May 20th, 1903.)

The earliest Acadian magazine of which there appears to be any record was *The Nova Scotia Magazine,* of which 5 volumes were printed at Halifax, N.S., during the years 1789-92. This magazine contained but little original matter, and abounded in anecdotes and selected articles culled from *The European Magazine, The American Museum, The Massachusetts Magazine, The Imperial Magazine* and from many other sources. It also contained a large amount of poetry, part of which was of local origin. "Pollio," of Halifax, must have been a verse writer of influence, as several efforts appear over his signature. One of these written "For the Nova Scotia Magazine" is entitled "Odin, An Highland Ballad Versified." The editor of the magazine deals tenderly with "Pollio" and his short-comings in part as follows:—

"We take the liberty of calling our ingenious correspondent's attention to a few of his rhymes. He well knows that their harmony in no wise depends on the similarity of the written words, but on sound only: Therefore, though we are aware he can produce too many instances from the greatest English poets, we would advise him to be guided by his ear alone."

Then follow some examples of bad rhymes such as health, death, move, love, red, mead, convey, sea, etc. The editor further adds:—

"These remarks, we confide, will be received with the same spirit they are offered; which is only that of friendly communication. Cheap as they are, we would not have spent them upon an inferior writer. But from 'Pollio' we hope for many future favours; and, if he thinks with us, the least contention can easily remedy this trifling defect; trifling, we know, not from poverty of words, but more likely from too hasty composition."

The following translation of the thirty-third Ode of Anacreon, signed "Minimus," and which appeared in *The Nova Scotia Magazine* for March, 1790, p. 230, is not without merit. By a singular co-incidence a translation of the same Ode by W. P. Dole, LL.D. of St. John, N.B., appears in *Stewart's Quarterly,* published eighty years later, and although more extended reference is made in this paper both to *Stewart's Quarterly* and to the writings of Dr. Dole, it may not now be inappropriate to give both translations for the purposes of comparison. Singu-

larly enough it was only when discussing the outlines of the paper now before you with the writer that Dr. Dole became aware of the earlier translation by "Minimus."

For *The Nova Scotia Magazine.*

Translation of the thirty-third Ode of Anacreon.

You, dear Swallow once a year,
In Summer's genial heat appear;
Once a curious mansion build,
Once with little swallows filled:—

But love, within my hopeless breast,
Hath built a never falling nest.
Some young desires in plumage bright,
Half of some the shells detain;
Some within the egg remain.
The chirping brood with careless noise,
Stun my ears and kill my joys.
The elder loves, the younger feed:
These again with wondrous speed,
Other generations breed.
Ah! what can ease this wretched breast
With such a swarm of loves possessed!

Minimus.

(*The Nova Scotia Magazine*, March, 1790, p. 230.)

The following is the text of Dr. Dole's translation:—

Dear Swallow! you, a friendly comer,
Returning every year,
Build your nest here in the Summer,
In Winter disappear.

For Nile or Memphis far you leave:
But love within my heart
His downy nest doth ever weave,
And never will depart.

One passing is just getting wings,
One hatching, one on egg:
A clamorous cry unceasing springs
From gaping mouths that beg.

The older loves quick zeal display
The younger brood to feed;
These, brought up, in their turn straightway
Another nestful breed.

What remedy therefore have I?
Since every effort proves
I have not power, howe'er I try,
To drive away such loves.

W. P. D.

(From *Stewart's Quarterly*, Vol. 3, No. 3, Oct., 1869, p. 252.)

Some attention is paid in this magazine to the movements of the Governor, the doings of the Provincial Legislature and the school examinations at Windsor, and at Halifax. That the practice of branding felons was then in vogue will be observed from the statement that at a Court of Oyer and Terminer and General Goal Delivery, held by special Commission before the Hon. James Brenton, Richard John Uniacke and James Newton, Esquires, on Friday, February 19th, 1790, John Stewart, Ebenezer Wright, Jane Wishart and George Smith were found guilty of Grand Larceny and ordered to be branded.

From the proceedings of the House of Assembly it is learned that Major Barclay presented to the speaker a specimen of some iron from the Iron Works, lately established at Wilmot and referred the House to Major Millidge for further information. The last named gentlemen on being asked by the speaker what quantity of iron he supposed the works in their present state could produce yearly, said about 30 tons, but that the proprietor was about erecting another fire which would enable him to produce at least 60 tons. "This information gave much satisfaction to the House, who were also much pleased with the sample of the iron produced."

Scanty and primitive as are the notices of local men and affairs contained in this first effort to found an Acadian magazine, the volumes yet contain much of interest and value to the student of local history.

This magazine was edited at Windsor, where, in the year 1792, King's College was established.

Of *The Nova Scotia and New Brunswick or Historical, Literary, Theological and Miscellaneous Repository,* Halifax, 1806, we are informed that one number is extant. They were all fond of long titles and of sub-titles, in these early days of magazine making, but it was the fashion of the times elsewhere as well as in Nova Scotia. In *The History of Halifax City,* published by the Nova Scotia Historical Society, page 139, will be found a very brief reference to this magazine. It was offered for sale at the bookstores of Messrs. Morrison, Bennett, Edward Ward and William Minns.

In July, 1826, appeared the first number of *The Acadian Magazine; or Literary Mirror,* consisting of original and selected matter on literary and other subjects. This magazine was published at Halifax for the proprietors, and was printed by J. S. Cunnabell, 105 Barrington St., the subscription price being $4.00 per annum — half in advance.

The following list of agents will, perhaps, be of some interest: "Subscriptions received by the following agents:—Benjamin DeWolf, Esq., Windsor; W. Sargent, Esq., Barrington; Mr. William J. Ward, Shelbourne; F. S. Blanchard, Esq., Truro; R. Dickson, Esq., Onslow;

H. G. Farish, Esq., Yarmouth; T. Roach, Esq., Cumberland; Mr. John H. Freeman, Liverpool; W. Salter, Esq., Newport; Mr. Joshua M. Rae, Lunenburg; James Ratchford, Jr., Esq., Parrsborough; John Wier, Esq., Londonderry; William Pope, Esq., Bedeque, P.E.I.; M. C. C. Tropolet, St. John, N.B.; Mr. Edward Baker, Fredericton, N.B."

The first volume contains three illustrations or "embellishments" as they are styled, of the Prince House at Halifax, a view of Windsor, and a portrait of the then Duke of York.

The Acadian Magazine contains much more local and original matter than its precursor, *The Nova Scotia Magazine.* An extensive review appears of "The Rising Village," by Oliver Goldsmith, descendant of the author of the "Deserted Village," which was published with a preface by the Bishop of Nova Scotia. (London, 1825, 48 pages. Price, 2s. 6d.) This poem, while not of a very high order of merit is yet a distinct advance in style and thought over some of the poetical effusions which appeared at the end of the previous century.

It is amusing to note the rapid advance of the pedler into the more dignified station of a merchant, and a few lines from the earlier portion of the poem may perhaps be quoted: —

"While now the rising village claims a name,
Its limits still increase, and still its fame,
The wand'ring Pedler, who undaunted trac'd
His lonely footsteps o'er the silent waste;
Who travers'd once the cold and snow-clad plain,
Reckless of danger, trouble or of pain,
To find a market for his little wares!
The source of all his hopes, and all his cares,
Establish'd here, his settled home maintains,
And soon a merchant's higher title gains.

"Around his store on spacious shelves array'd,
Behold his great and various stock in trade.
Here, nails and blankets, side by side are seen,
There horses' collars, and a large tureen;
Buttons and tumblers, cod-hooks, spoons and knives
Shawls for young damsels, flannels for old wives;
Wool, cards and stockings, hats for men and boys,
Mill-saws and fenders, silks and infant' toys;
All useful things, and join'd with many more,
Compose the well assorted country store."

Since these days the "shawls for young damsels" have been superseded by the tailor-made gown, or as close an imitation of such as the ingenuity or purse of the country maiden of this generation will permit; mill-saws and fenders have been more or less put out of business by the band-saw and the jacknife saw-mill, the latter of which travels the country laying waste many beautiful places and seeking what it may

devour. Neville Parker, Master of the Rolls in New Brunswick, used to write poetry, some of it very clever, and Cecil and Atticus in *The Acadian Magazine* may have been written by either Neville Parker or his brother Robert, as they were students at college at Windsor, N.S., about that date. This is merely a surmise, but the solution offered is one that is by no means improbable.

In January, 1827, the following address, which is self-explanatory appeared in *The Acadian Magazine.*

ADDRESS.

At the opening of a new year it is usual for the managers of periodical publications to address their readers with compliments and thanks. We have now proceeded in our undertaking as far as the seventh number, and having received a very generous support from the public, it would be ungrateful in us to overlook an occasion of the kind.

When we commenced the magazine, it was not under the most favourable auspices. A magazine has been tried in an earlier period of our provincial history. It was a compilation of extracted matter from English works. Although the selections it contained were very judicious, yet the period had not then arrived for the establishment of such a work, and it was after a fair trial reluctantly abandoned. We were told it was still a premature and rash speculation, that the country still depended upon casual foreign supplies for its men of talent and genius, and that it could not afford such contributions of original writings as would insure success, or even a lasting existence to a magazine. Under this cloud of discouragement we ventured on our perilous flight, and although we may not have soared to the empyrean heights of literature on newly fledged pinions, we trust we have not yet sunk to the earth, or approached the bathos. Our progress in gaining subscriptions and communications to the work, has not fallen short of the expectations we formed at the outset, and we find the number of friends progressively increasing. While this continues to be our situation, we shall not flinch from our post. We are decidedly of opinion, that the character, wealth and happiness of Nova Scotia, will receive material improvement by the growth and extension of our literature. It is not to be concealed, that an opinion is disseminated by some, that we can hope but little from the exertions of the pen; but it is the duty of every Nova Scotian to join with ardor in wiping off the reproach that attaches to us.

We return our warmest thanks to our many correspondents, both in this province, and the sister colony, New Brunswick. We shall endeavour to make our work generally interesting to readers residing in New Brunswick and Prince Edward Island as well as in this province.

We have the greater pleasure in giving the present number to the press, because we have not found it necessary to make any selections, the original communications admitted having entirely filled it. We will endeavour to add still further to the interest of the work in the course of a month or two, as we have the promise of additional assistance from literary friends.

Wishing the reader a happy New Year, we take our leave for the present.

Two years (despite the self-confidence of its editor) saw the end of *The Acadian Magazine,* and June, 1828, was the date of its last issue. Thus passed into history the third Acadian Magazine.

Following *The Acadian Magazine* came *The Halifax Monthly Magazine,* of which three volumes were published, bearing date 1830-3. This is stated to have been a creditable production. It was "printed and published by J. S. Cunnabel, Argyll Street, opposite the west end Dalhousie College," the subscription rate being 12 shillings per annum. "It dealt with current politics, contained fiction, poetry and sketches, most of them apparently original, and an article on the death and character of George IV., may have created a stir at the time." It is a matter of regret that at the time of writing this sketch a copy of this interesting publication was not available for the purpose of review, at least not in the city of St. John.

From some very voluminous manuscript records of the early history of the Press in New Brunswick compiled by the late Joseph W. Lawrence and now in the possession of Mr. Frank B. Ellis, of St. John, we learn that in 1834 Mr. George Blatch published from the office of *The St. John Observer* the *Two Penny Magazine, a weekly museum of literary amusement and instruction.*

Concerning it the editor of *The St. John Courier* wrote "from the editor's known talent, and the extensive literary correspondence and other means of obtaining useful information which he enjoys, we are confident *The Two Penny Magazine* only wants a commensurate patronage, to render it amusing and instructive, as well as a deserving publication."

Mr. Lawrence expresses the opinion that in this enterprise Mr. Blatch was in advance of the time, and that the work was consequently early abandoned. For a number of years he kept a book and music store, importing pianos from England. He subsequently studied law, and was admitted to the Bar about 1848. In 1868 he was appointed registrar of the Court of Vice-Admiralty and later was made clerk of the Supreme Court for the City and County of St. John. As a lecturer in the St. John Mechanics Institute in its early days Mr. Blatch was decidedly popular.

In September, 1840, there appeared *The British North American Wesleyan Methodist Magazine* — published (monthly) by "connexional authority."

Volume one, including sixteen numbers, from September, 1840, to December, 1841, inclusive, and volumes two to four twelve numbers each, 1842-44, were published by Henry Chubb & Co., of St. John, N.B. The magazine was then discontinued for a year and a half, and

volume five, June, 1846, to May, 1847, inclusive, was published by James Hogg at Fredericton, N.B.

In the month of January, 1841, there was issued by Robert Shives the first number of *The Amaranth.*

Robert Shives was a great-grandson of Robert Kilgour, Bishop of Aberdeen, one of the Consecrators in 1786 of Dr. Seabury, of Connecticut, the first bishop of the Protestant Episcopal Church in America. The father of Robert Shives was a native of Aberdeen, came to St. John and engaged in commerce. In 1811 he married a daughter of John Wiggins, of Portland, not long after which he visited Scotland, and there his son Robert was born. Mr. Shives, Sen., died at St. John, December 30th, 1824, at the early age of 37 years, and was buried in the old historic burial ground adjoining King Square.

On the 27th June, 1827, Robert entered the printing office of *The Courier* as an apprentice. In 1834, upon completing his time, as it was called, he went to Scotland where he spent two years. On his return in 1836, he re-entered the office of *The Courier,* where he remained until 1840, when he commenced the publication of *The Amaranth, a monthly magazine.*

During the apprenticeship of Robert Shives the volumes of *The Courier* were enriched by the letters of John Gape, which continued for a year, increasing the circulation of the paper from 800 to 1,500 copies, creating a sensation in New Brunswick not unlike the letters of Junius in England. They related chiefly to the Crown Land Department. At this time the offices of Commissioner and Surveyor-General were held by Hon. Thomas Baillie, and from them he received salaries amounting to £2,019.

One of the grievances complained of by John Gape, was the large amount paid to Mr. Baillie.[1]

The Amaranth was the first literary magazine published in New Brunswick, which contained much literary material of value and interest, and it was without doubt the best effort yet made to establish a magazine of a high class of literary excellence in the Acadian Provinces. Indeed, it may well be claimed that for fascinating interest and artistic word painting, the articles which appeared therein from the pen of Moses H. Perley, have possibly not been equalled and certainly not excelled by any other Acadian magazine writer. The sketches first appeared in *The London Sporting Review* and were republished in *The Amaranth.* Mr. Perley was a native of New Brunswick, a man of great literary capability and one who, from his knowledge of his native

[1] (From manuscript of late J. W. Lawrence on Early Printers and Early Newspapers of New Brunswick, now in possession of Frank B. Ellis of St. John).

province, its beauties and its possibilities, was able to assist in making more widely known its many attractions.

Mr. W. R. M. Burtis, for many years common clerk of the City of St. John, was also a writer of merit and a frequent contributor to the pages of *The Amaranth,* his story of Indian life, "The Storm Spirit of the Milicites" having been more than once republished by later periodicals.

In all the older magazines it is difficult, and in the majority of cases impossible at this late period to ascertain the identity of the various local contributors. In fact so much care was taken upon this point that it is difficult to discover even the names of the editors of many of them. In this respect *The Amaranth* more nearly approached the modern ideal of a literary magazine. Some of the articles by local contributors bear the writer's signature, while in other cases the first and last letters of the writer's surname are given. By this aid Mr. Jonas Howe in a very excellent article upon *The Amaranth,* which appeared in *Acadiensis* in July, 1902, has been able to discover and place permanently upon record the names of its more important contributors.

Turning carelessly over the pages of the first volume of *The Amaranth* recently, a poem on page 268 immediately attracted attention. It was entitled "The Dying Chief," and was signed "J. A.," Westmorland, July. The first three stanzas are as follows:—

THE DYING CHIEF.

The stars look'd down on the battle plain,
When night winds were deeply sighing,
And with shattered lance near his war-steed slain,
Lay a youthful warrior dying.

He had folded round his gallant breast
The banner once o'er him streaming,
For a noble shroud as he sunk to rest,
On the couch that knows no dreaming.

Proudly he lay on his broken shield
By the rushing Guadalquiver—
While dark with the blood of his last red field,
Swept on the majestic river.

Turning further on to the end of the following number of *The Amaranth,* we find the following brief but pointed editorial comment:

"The poetry, entitled, "The Dying Chief" which appeared in our last number, as an original contribution, is an extract from a volume of poems published in England. The gentleman (?) who sent this manuscript to our office, and who, instead of placing his own

initials to it added those of another, is cautioned against trying his plagiarisms in future. We had strong doubts as to the originality of the piece when we gave it a place on our pages."

In April, 1842, the editor of *The Amaranth* welcomed to the ranks of Acadian Literature *The Nova Scotia New Monthly Magazine* in the following words:—

"The first number of this work is now before us, and we hail its appearance with pleasure, as a valuable addition to our Colonial Literature. The contents of the present number are rich and varied—the original articles are written with good taste and judgment, and the selected ones are from the choicest works of the day. From the energy and resources of the publishers, we are led to believe that *The New Monthly* will become very popular."

This magazine was 32 pages in extent, octavo in size, and published by Simpson & Kirk of Halifax, the St. John agency being at "The Circulating Library, Germain Street." The subscription price was 8s. 9d., including postage.

From the pages of the first number of the new magazine was republished in *The Amaranth*, a poem entitled "The Fossil," addressed to ——, generally supposed to be to Dr. Abraham Gesner, a well known scientist who lived in St. John, and who left behind him valuable works on the geography of New Brunswick and Acadian Geology, and who gathered the nucleus of what was afterwards the Museum of the St. John Mechanics Institute, now owned by the Natural History Society of St. John.

As the poem alluded to is not lengthy, and is of some merit, it may perhaps be quoted at length. Unfortunately no clue is given as to the identity of the writer.

It reads as follows:—

THE FOSSIL.

Once in the young earth's golden prime,
'Ere care made grey the wing of time,
There fell a green leaf on the shore;
And it floated away on the wandering wave,
And found in the deep green sea a grave,
And ne'er was thought on more.

Ages rolled on, and the rocking earth
Had seen a new creation's birth,
And Empires rise and fall:
But none e'er thought how that green leaf slept,
Like a treasured thing by Enchanter kept,
'Neath the old earth's marble wall,—

Till on a day, as it befel
A sage unsealed the mighty spell
Of nature's treasure cave,—
And, changed to a hard engraven stone,
Lo! the frail leaf that, ages gone,
With its fall scarce stirred the earth.

And hath not the heart full many a dream,
That falls as that noiseless leaf on the stream,
And as silently sinks to rest—
And the tide of life rolls over its sleep,
In those shadowy caves—the wondrous deep
Of the fathomless human breast.

But when shall those caverns yield their dead—
The dreams of the past—the thoughts long fled?
Oh! not for the prying world:
But in that last dread day, when souls
Must give to light their hidden scrolls,
Will their secrets be unfurled.

And then on my heart will the memory
Be read engraven lastingly,
Like the leaf on the marble bright
But halo'd around with purity,
That will not shrink from an angel's eye,
In that blaze of perfect light.

The Mayflower or Ladies Acadian Newspaper appeared in 1851, not less than five numbers being published. Of this periodical, Miss Herbert was the editor, and the place of publication was at Halifax.

The Mount Allison Academic Gazette was the official organ of the Mount Allison (N.B.) institutions for about ten years, during which time it was issued semi-annually, and took the place of the catalogues usually published by educational institutions.

No. 1 was dated December, 1853, and contained 6 pages, of closely printed matter, of about quarto size, relating to the Academy and its affairs.

In 1862 the University was opened, this publication taking the name of *The Mount Allison Gazette,* New Series of which there were but two issues, namely, June, 1863, No. 1, and December, 1863, No. 2.

The Eurhetorian Argosy appeared in 1878. Vol. No. 1, January to June, contained six numbers. This was the College paper of the Mount Allison Institutions, and in May, 1903, it will have completed its twenty-ninth volume, being now known as *The Argosy.*

The next magazine in the order of publication, of which I have been able to find any record was *The Provincial or Halifax Monthly Magazine,* which was printed by James Bowes & Son, and was ably

edited by Mrs. William Lawson. Mention is made of it in the article on[1] Canadian Magazines before alluded to, and Mr. Arthur H. U. Colquhoun remarks therein that "the articles on copy-right, on the new system of telegraphs, and on various subjects of timely interest indicated good editorship, and a staff of competent writers." But in December, 1853, after two years of dauntless effort, the periodical gave up with a cry of "no subscribers."

After 1853, all attempts at the publication of a literary magazine in Nova Scotia appear to have been abandoned, and for the literary ventures of this class for the next half century we must look to New Brunswick and Prince Edward Island.

In *McFarlane's Bibliography of New Brunswick*, page 58, a most valuable publication, by the way, is noted, "The Parish School Advocate," edited by Alexander Munro. The first number was issued Jan. 1st, 1858. Its platform was as follows:—

1st. Free schools, supported by direct assessment to a limited extent.

2nd. The Bible, the test mark of moral obligation, without which education is useless.

In 1895, *The Chignecto Post*, published at Sackville, N.B., and edited by W. C. Milner, celebrated its twenty-fifth birthday, by the issue of a thirty page number, which contained a very full biographical sketch of Mr. Munro accompanied by his portrait.

In *The New Brunswick Magazine*, volume 1, No. 2, pp. 78-80-81, will be found an article from the pen of Dr. George Stewart of Quebec, and entitled *An Early New Brunswick Magazine*. This article gives an excellent idea of *The Guardian*, the magazine just mentioned, and a few notes from the article named may perhaps be admissible.

Dr. Stewart informs us that the new venture was on a more ambitious scale than *The Amaranth*, the editors and publishers being Messrs. Edward Manning and R. Aitkin. It was issued monthly at St. John, and lasted for nine months only, being withdrawn in September, 1860.

The Guardian was devoted to education and general literature. It was printed by the firm of Barnes & Co., of St. John, who like the historic firm of H. Chubb & Co., of St. John, and Cunnabel, of Halifax, have aided in the conception of many literary ventures.

Anything relating to New Brunswick but politics, was the maxim of its editors. It was to be largely provincial in its tone and character, and a lengthy programme was prepared. Papers relating to Nova Scotia

[1] A Century of Canadian Magazines, by Arthur H. U. Colquhoun, *Canadian Magazine*, 1901, Vol. 17, p. 141.

and Prince Edward Island were not debarred from its pages however. Its contributors were not paid.

Mr. William R. M. Burtis who had been a valued contributor of fiction to *The Amaranth*, provided most of the fiction published, his story entitled "Grace Thornton, A Tale of Acadia," continuing through eleven chapters.

An amusing printer's error occurred in connection with a series of papers written by Mr. R. Penniston Starr, a leading coal merchant of St. John, and a man of good literary taste. The last page of Mr. Starr's first article, contained his initials, which were not observed, however, by the compositor. What the compositor did observe, were the letters P. T. O. (please turn over), at the foot of the page preceding the last. P. T. O. was forthwith adopted by Mr. Starr as his pseudonym, much to the amusement of those who were aware of the joke.

Dr. Stewart further tells us that such subjects as "Poetry in America," "British Poetry," "State of the World at the Christian Advent," etc., appeared, and that they were pretty heavy, but that there was a good list upon provincial subjects, such as "The Botany of the Lower Provinces," "Education in New Brunswick," "The Geography of New Brunswick," "Geography of Nova Scotia," "History of Acadia," and "The History of the Loyalists." The caribou and the Canadian grouse or Spruce partridge were also written upon.

The nine numbers when bound, made a volume of 218 pages, the cost to subscribers for the set being two shillings and sixpence.

Prof. W. F. Ganong, of Smith College, Northampton, Mass., is the owner of a complete set of *The Guardian.*

The Progress Magazine was the first published in Prince Edward Island, and it was started in the *Progress* office by Thomas Kirwin, in 1868, so we are informed by Mr. Cecil T. Bagnall in a short article in the Christmas number, 1902, of *The Prince Edward Island Magazine.* Regarding its publisher Mr. Kirwin, we are informed that he was a splendid specimen of Prince Edward Island manhood, and that he was born at Tryon, on the 17th April, 1832. Losing both parents before he was eight years old, he was taken to Charlottetown by an older married sister, and sent to a private school, afterwards entering the Old Central Academy, changed to Prince of Wales College, then under the mastership of John Arbuckle. He learned his trade as a printer in the establishment of John J. Pippy in Charlottetown, afterwards removing to Boston, Mass.

In 1862 Mr. Kirwin fought in the war of the Rebellion, was wounded and later sent home. 1866 he went to Summerside and started *The Progress* newspaper, and continued to publish it for three years, at the end of which time he again returned to Boston, where he has

since permanently resided, now enjoying a responsible editorial position on *The Herald,* which he has held for twenty-one years.

In a personal letter from Mr. Archibald Irwin, the editor of *The Prince Edward Island Magazine,* that gentleman states that only one copy of *The Progress Magazine* was printed, and that it was altogether made up of clippings from British and American magazines and newspapers on miscellaneous subjects. It appears to have commenced and ended with number one. The page was about 5½ x 8 inches in size, set two columns to the page. Typographically it was neat but not at all superior in style.

In 1867, Dr. George Stewart, then a young and enterprising druggist, with a place of business on King street in the city of St. John, commenced the publication of *Stewart's Quarterly,* a periodical which was conducted with much ability, and in the editing of which he had the assistance of writers of more than ordinary talent. This magazine was more general in its interests, and therefore appealed to a wider range of supporters than did any of its predecessors.

Like most of the boys of that period, and of the twenty years following, Dr. Stewart appears to have had the stamp collecting mania in an acute form.

In "Literary Reminiscences" published by Dr. Stewart in the *Canadian Magazine,* that writer informs us that "he began to write for the press very early in life, and in 1865, in St. John, N.B., established *The Stamp Collectors' Monthly Gazette,*[1] which was withdrawn in 1867," when *Stewart's Quarterly* was founded in the same city.

Concerning the *Quarterly,* Dr. Stewart informs us that "it lived five years, and though, as a financial venture it was not very profitable, it earned quite a reputation in Canadian letters. Its contributors were drawn from Newfoundland to British Columbia. The Rev. Moses Harvey of St. John's, as well as Judge Prowse, were frequent writers in its pages. Dr. Harvey's valuable papers on Newfoundland did much to make that ancient colony known all over the world, for the newspapers, attracted by the author's attractive style, made copious extracts from his articles."

A complete set of *Stewart's Quarterly* is now difficult, in fact almost impossible to obtain.

Taking up at random the fourth volume, the only one in the writer's own collection which is complete, it appears full of interest, and treats of a variety of enticing topics.

One of the principal poetical contributors was Enyella Alleyne, three examples of whose skill as a verse writer appear in this volume. The leading editorial article in the first number, is devoted to the

[1] Canadian Mag., Vol. XVII, No. 2, June, 1901, page 163.

writings of this contributor. So well was the identity of the poet concealed that even the editor of the magazine in which the poems from time to time appeared, was deceived, and supposed that it was to one of the fair sex that he was indebted for the really creditable verses which from time to time adorned the pages of his magazine.

The editorial opens thus: —

"Some three months ago the literary world of Canada became aware of the fact that a poet of no ordinary powers was among them. Yet so modest has been this lady (for who else but a woman was it who joined together such strings of linked sweetness long drawn out, as Milton hath it) that, though her graceful compositions have attracted the attention of admiring thousands, she still holds from the public eye her name, and only suffers her mysterious signature, which reads the same backwards and forwards, to accompany the fruits of her muse."

"In the columns of *The Daily Telegraph and Journal* this new light sought fame, and in that widely circulated journal *she* obtained it."

It occasioned great surprise when it became known that the writer Enyella Alleyne was Mr. H. L. Spencer, afterwards editor of *The Maritime Monthly*. Mr. Spencer is still actively engaged in the newspaper work in St. John.

From the verses of Enyella Alleyne, one example is submitted for your criticism:

Upon the beach I walked at eve alone,
And listened to the moaning of the sea,
And watched the sails that in the moonlight shone
At the horizon: Unto me
There came a voice, as from below the waves,—
"The less'ning sail will soon be seen no more,
"And as I sweep thy footprints from the shore,
"Time mosses o'er a world of unknown graves.

"And it is well. If men could not forget,
"With phantoms all the world would peopled be
"The ghosts of buried joys their hearts would fret
"A flood of tears like blood, would drown the sea.

"Rail not at time—the healer of thy woes—
"As of those thou hast forgotten, shall be thy last repose."

As the majority of readers now find it impossible to identify most of the writers, who, under assumed names contributed to the earlier Acadian Magazines, so in another generation the names of many of those who contributed in no small degree to the literary success of *Stewart's Quarterly* might be equally difficult to obtain. For this

reason the names of such of them as, with some assistance, have been identified, are herewith appended.

Nom-de-Plume.	Writer's Name.
Damon	Rev. Maurice Swabey of P. E. I., later Rector of Exeter.
Pythias	
W.P.D.	William P. Dole, LL.D.
Laelius	William P. Dole, LL.D.
"G."	William P. Dole, LL.D.
J. W. G.	J. W. Gray (artist), Montreal.
I. A. J.	Isaac Allen Jack, D.C.L., of St. John, N.B.
An Old Angler	W. H. Venning, now of Sussex, N.B. Mr. Venning wrote Sporting Sketches in Maine and New Brunswick. These were written originally for the *Atlantic Monthly*, but were rejected by the editor of that magazine.
"E." "G." "N."	Edward G. Nelson, St. John.
Lynden	J. L. Stewart, now living at Chatham, N.B., where he edited the *Miramichi Advance*. Mr. Stewart's second name is Lynden.
Publicus	A. A. Stockton, LL.D., of St. John, who wrote an able article on the "Fishery Question."
Diana	Supposed to have been Miss S. Irene Elder.
N. E. S.	John Valentine Ellis, who has been for many years editor of the *St. John Globe*. The letters N. E. S. are the final letters of each of his names. Mr. Ellis is now a member of the Senate of Canada, and is too well known to need any introduction here.
H. L. S.	H. L. Spencer, before alluded to and known also as Enyella Alleyne.
Clifton	Jonas Howe, of St. John, N.B.

Alexander Rae Garvie, who resided in Miramichi, N.B., was a contributor to *The Quarterly*, and was a member of a very clever family He was a brother of T. C. Garvie, of Halifax. His article on "Plaugarism" and "A Reverie" attracted the most attention. He published a volume of poems "Thistledown." He died in Montreal, March, 1874. Extensive notices of Mr. Garvie appear in *The Maritime Monthly*, volume III., No. 4, March, 1874; also volume V., page 89, 1875, which magazine followed immediately after *Stewart's Quarterly*.

Andrew Archer of Fredericton, was a contributor to *The Quarterly*, signing himself "A Bowman," this being a pleasantry upon the name of Archer. He was a dentist by profession, but never allowed himself to be styled Doctor.

Mr. Archer compiled "Archer's History of Canada," used for some years in the New Brunswick Public Schools. He edited a weekly newspaper, published at Fredericton about 1870, entitled *Head Quarters*, and which had quite a good literary tone.

Charles H. Hallock, founder and first editor of *Forest and Stream*, still writes for that publication. He lived in St. John and carried on a business in Chubb's building as a stock and exchange broker during the war of the American Rebellion. It was supposed that his sympathies were rather with the South in that memorable struggle. At the close of the war he returned to the United States.

Dr. Lucius Allison was the alleged writer of a clever and humorous article, entitled "About Some Old Girls."

Mr. Hunter Duvar was a well-known contributor, both in prose and verse to several of the Acadian magazines. Some of his writings were well thought of. *The Prince Edward Island Magazine* contains some good examples of his work, as well as an obituary notice, published with his portrait at the time of his death.

It would not be just to conclude this somewhat lengthy list without a more extended reference to W. P. Dole, LL.D., who has been a willing and valuable assistant in nearly all of the magazine enterprises which have been launched in New Brunswick, from the first issue of *Stewart's Quarterly* to the present day.

The Shady Side—Unsuccessful men—Youth—Bubbles—and a review of Gladstone's Juventus Mundi were contributed to *Stewart's Quarterly*, by Dr. Dole over the *nom-de-plume* of Laelius. Of these "Youth" was the most popular.

An example of Dr. Dole's ability as a verse writer has already been given. Another which simply bears the initial "C," and which appeared in *Stewart's Quarterly*, is considered by him to be one of his best efforts in verse.

Following immediately upon *Stewart's Quarterly*, appeared *The Maritime Monthly*, edited by Mr. H. L. Spencer, the first number of which was published at St. John, in 1873. It was continued through at least five volumes of six numbers each.

It was a well edited magazine, containing only original contributions, but it was perhaps not quite up to the standard of *Stewart's Quarterly*. It ventured somewhat into the realm of religious denominational discussion and of local politics, possibly not to the furtherance of the welfare of the magazine.

Many of those who had been contributors to Mr. Stewart's magazine continued to support *The Maritime Monthly*, which was published under the auspices of the "Maritime Monthly Club," the members of which were as follows:—

Mr. John Boyd, at the time of his death the newly appointed governor of New Brunswick. He was a well known writer and lecturer.

Mr. H. L. Spencer, who has been elsewhere alluded to.

Mr. John McMillan, of the firm of J. & A. McMillan, booksellers and publishers, by whom the magazine was printed. The firm of McMillan was far in advance of the times, for many years carrying on an establishment that had no equal in the Acadian provinces, and possibly no superior throughout Canada.

Mr. Ezekiel McLeod, now a judge of the Supreme Court of New Brunswick.

Rev. James Bennett, afterwards Doctor of Divinity, a minister of the Presbyterian Church, a man of good literary attainments, but somewhat slovenly in his style and methods of work.

Mr. J. Newton Wilson, a merchant of St. John, and an occasional contributor to the pages of the magazine.

Mr. T. M. Robinson, for many years connected with the Western Union Telegraph Company at St. John.

Two valuable papers which appeared were "The First Courts and Early Judges of New Brunswick," a paper read before the New Brunswick Historical Society, on November 25th, 1874, on the occasion of the inauguration of the Society, by the late Joseph Wilson Lawrence: and "Our Blind," by I. Allen Jack, A.B., now D.C.L., a paper of eleven pages, the writer of which acknowledges valuable assistance from C. F. Fraser and M. H. Richey of the Blind Asylum, Halifax, and from Dr. Wiggins, Principal of the Institution for the blind at Brantford, Ontario.

Dr. Jack also contributed some verses and an article of 26 pages entitled "The Church, the State and the School."

Rev. Moses Harvey of Newfoundland, Hunter Duvar, Mary Barry, William Murdock, George J.Forbes, Olga Stewart of Halifax, and the late Edward Jack, C.E., were contributors.

C. M. and C. D. M. of Halifax, possibly one and the same writer, but whose identity cannot at present be stated, contributed translations from the German in verse.

Vol. III, No. 4, of *The Maritime Monthly* contained a three page review of the literary work and lectures of Mr. John Boyd, afterwards Senator and Governor elect of New Brunswick. These lectures were delivered in New Brunswick, Nova Scotia, and some parts of the United States, in no case for a pecuniary consideration, so it is stated, but for the benefit of literary and educational institutions, libraries, churches, public and private charities, etc. In this review are enumerated with much minuteness of detail the services of Mr. Boyd in this particular, and an approximate financial value is set upon each item, the grand total amounting to $26,300. It is also stated that "we do not include in the above, several readings given by Mr. Boyd at sea, one of which

on the 'Scotia,' in conjunction with Mrs. Scott Siddons, when he was returning last from England, yielded $300 for the Seaman's Orphan Asylum, Liverpool."

The modesty of this last paragraph reminds one of a story related at the expense of a brother merchant who was a near neighbour of Mr. Boyd's, and who was wont to allude to the establishment in which he was a junior as being conducted by "me and Mr. Turgar."

As Mr. Boyd was one of the Maritime Monthly Club, it would at least have been in good taste had the article so highly eulogistic of himself been suppressed.

In the fifth number of volume 4 appears a vigorous and scathing review, twelve pages in extent, of a sermon upon "The Apostolic Origin of the Church of England," by the Rev. Francis Partridge, now Dean of the Cathedral at Fredericton, and at that time Rector of Rothesay, N.B. The sermon referred to was preached in Trinity Church, St. John, on the 2nd July, 1874.

From the literary style of this composition, the well known opinions of Rev. James Bennett upon such subjects, and his connection with the magazine, we may reasonably infer that the review was from the pen of that well known Presbyterian divine.

Whether we concur in the views expressed by Dean Partridge or not, we must at least admit that he was quite within his rights in preaching such a sermon if he wished to, and like the eulogy of Mr. Boyd we cannot but feel that it would have been in the best interests of the magazine had the article not been permitted to appear.

Soon after this date *The Maritime Monthly* appears to have become embroiled with *The Daily Telegraph*, then edited by Rev. William Elder, D.D. over the "Louisiana Difficulty." Upon this topic the *Monthly* takes occasion to remark that;—

"Last month we expressed our candid convictions about the much talked of Louisiana difficulty. We do not believe in forming conclusions upon exparte statement of facts. Our remarks appear to have offended *The Telegraph*. We were by it held up as a disgrace to the "Canadian Press," for our fearless and independent expression of opinion. We hope no more serious charge can be brought against the "Canadian Press." We sincerely pity the editor who is capable of flinging such impotent thunder upon such a flimsy pretext. But *mirabile dictu*, we are told that we should be ashamed of ourselves for expressing opinions upon such a topic, different from *The Telegraph*, and the great majority of leading newspapers, and some very eminent men in England and America. On the contrary we are not ashamed, but we

beg to enter our decided protest against the "back-boneless lubricity" of our contemporary's logic."

In the same issue of *The Maritime Monthly* appears the following extract from *The American Canadian Gazette*, published at Boston, Mass.

"We see that a St. John paper, in the course of some censures on *The Maritime Monthly* for February, makes much ado over its lack of articles on Canadian subjects, and thinks the publication of the sixth paper of the series on the "Valley of the Platte" while but one or two of the other contributions have a local significance, displays great want of judgment. Such a criticism is either reprehensibly captious, or arises from a notable ignorance of periodical literature. No leading magazine or review in this country or in Europe is supposed to invariably devote any considerable portion of its space to discussion of local or national subjects, and some of them have contained almost interminable series on subjects altogether foreign.—*American Canadian Gazette.*

The editor of *The Maritime Monthly* thereupon takes occasion to remark that "The Platt Valley Papers will be continued next month."

Evil days appear to have by this time fallen upon this magazine, for the number last alluded to contains the notice that:—

"Thus far it has been published at a pecuniary loss to its proprietors. Shall it be sustained ? It is for our people to answer. Our subscription list must be doubled—our advertising patronage must be doubled—else the magazine must die. The proprietors have furnished a magazine which is an honor to the country. Will the country allow it to perish for want of support."

The country appears to have been deaf to this appeal, for soon after its publication *The Maritime Monthly* ceased to exist.

The University Monthly, published by the students of the University of New Brunswick, Fredericton, N.B., was first issued in 1882, the first number published bearing date March of that year. It is still continued, and is now in its twenty-third year. Prof. W. F. Ganong, who has previously been mentioned, has a complete fyle upon his library shelves.

On September 1st, 1882, the first number of *The Wollestook Gazette* appeared, published in connection with the St. John Grammar School Debating Society, with the following editorial staff from among the members of the Society, namely:—Theophilus Cushing, John A. Gallivan, David Russell Jack, Alexander W. Macrae and William C. Knowlton. The publication was about quarto size, sixteen pages in extent, including three pages of advertisements, and the issue was limited to

two hundred and fifty copies. All the members of the editorial staff, none of whom were at that time over 18 years of age, took an active interest in its promotion. The magazine was issued monthly for a year, with commendable promptitude, and by earnest dunning sufficient subscriptions were collected, which, with the assistance of the very generous advertising patronage received from persons interested in the welfare of the school, sufficed to meet all liabilities, with a surplus of $8.15 in the treasury.

Mr. M. Chamberlain was much interested in the undertaking and, in addition to his subscription, aided by literary contributions.

Messrs. Manchester, Robertson & Allison, Daniel & Boyd, through Hon. John Boyd, afterwards Lieutenant-Governor of New Brunswick, and Henry Jack were the principal advertisers, paying at the rate of $40.00 per page per annum.

The venture was an ambitious attempt at schoolboy journalism and created no little interest among the friends of the students.

The work was taken up during the following school year by an entirely new staff consisting of Frank B. Ellis, now on the staff of *The St. John Globe,* G. S. Sinclair, H. E. Goold, and L. M. Jewett. Among the principal literary contributors during the second year were G. S. Sinclair, now an Episcopal minister in the State of New York; G. M. Hayes, at present of the Finance Department, Ottawa; T. M. Dieuaide, who is to-day upon the staff of *The New York Sun,* F. S. Hartley, now a Baptist minister at Fredericton, N.B.; W. C. Cross and E. A. Powers.

In January, 1891, the first issue of *Canada* was published by Matthew Richey Knight, at Benton, N.B. The publication was issued monthly at 50 cents per annum, the price being afterwards raised to one dollar. Each number contained twelve pages, about 9 x 12 inches in size in double columns.

It claimed to be "A Monthly Journal of Religion, Patriotism, Science and Literature," and it appears to have made a vigorous bid for popular favour. Many club offers were made, and it was announced that every postmaster in Canada and the United States who sent twenty-five cents in stamps would receive *Canada* for a year, and would be appointed sole agent for his locality in addition to other inducements which were enumerated.

The magazine contained little, if anything of historic interest or permanent value.

The editor appears to have been addicted to the writing of poetry, for in addition to numerous other advertisements to which his name is appended, there is an announcement that "the poems of ten

years, by Matthew Richey Knight, price 40 cents, are for sale at the office of *Canada*, and by Knight & Co., Halifax, Nova Scotia."

For the benefit of persons who may not be aware of the geographical location of Benton, N.B., it might be added that it is a post village in Carleton County, 19 miles from Woodstock, contains one store, one hotel, a tannery and two saw-mills. No printing office is mentioned in the Gazetteer, so that *Canada* was probably printed elsewhere, Benton being merely the editorial and distributing centre. *Canada* does not appear to have been continued for more than two years at the most.

In the advertising columns of *Canada*, appears a notice of *The Echo*, a monthly of current notes and events, social gossip, etc. Price twenty-five cents a year, invariably in advance. It is doubtful if *The Echo* could be properly classed as a magazine.

Nova Scotia Illustrated, a monthly journal published at 41 Sackville St., Halifax, Nova Scotia, by J. H. Bradford, contained twenty pages. The first number of volume 1 was dated April, 1895.

In the same month appeared *The Occasional Magazine*, published monthly at five cents a copy, 50 cents a year. Professor R. C. Archibald, of the University of Mount Allison College, Sackville, writes that he has Nos. 1, 2, 3, and that it was published by Smith & Williams, Halifax, N.S., the size of page being 7½ x 5 inches.

The publication of *The New Brunswick Magazine* was commenced with the July issue of 1898, by William Kilby Reynolds, and it continued through three volumes of six numbers each, being issued monthly.

During this short period both the magazine and its editor passed through many vicissitudes. Most of these are of too recent occurrence to admit of their discussion in a paper such as the present.

During the first year of its publication the magazine was a valuable one, but at the end of that period, its editor feeling that he could not obtain sufficient revenue from the venture to pay the cost of publication and his own maintenance, accepted a position with the Intercolonial Railway of Canada, which required him to make Moncton his headquarters. Finding that it was impossible to satisfactorily conduct the magazine from that point, and give proper attention to his official duties, Mr. Reynolds, in the August issue of 1899, in a special announcement informs the public that *The New Brunswick Magazine* will in future be under the direction of Mr. John A. Bowes, from whose printing office it was issued from the beginning. Nos. 4 and 5 of the third volume were printed, bound, placed in wrappers and addressed to the various subscribers but no copies were distributed outside

the city of St. John. The sixth issue of Vol. III. was printed, but was never bound or distributed, and is now, or was recently, still in the hands of the binder awaiting its final disposition by the printer.

The Rev. W. O. Raymond, LL.D., of St. John, was a warm friend to the enterprise from its inception, and after its abandonment by Mr. Reynolds, that gentleman made desperate efforts to keep it alive. The third volume is, in itself, a monument to his industry and zeal, nearly all the articles which it contains being from his pen, either over his own name or the pseudonym of "Historicus."

Dr. Raymond's articles on "Portland Point," which continued all through the three volumes of the magazine, are of great historical value, and are without doubt the leading feature of the magazine.

Probably second in importance and historical value and quite unique in their character, was a series of compilations entitled "Provincial Chronology," not signed, but which were the work of Mr. Clarence Ward, who has been for the past nineteen years the Recording Secretary of the New Brunswick Historical Society.

These consisted of notes of events of an historical interest, a marriage notice and death notice of some prominent provincialist, one for each day in the month, arranged in chronological order.

Other important contributors were Prof. W. F. Ganong, Ph.D., of Smith College, Northampton, Mass., a provincialist by birth, who wrote, "Relics of the Acadian Period." "Thomas Carleton, Governor," "The Ashburton Treaty," "Where Stood Fort LaTour," etc., I. Allen Jack, D.C.L., writer of "Old Times in Victoria Ward" in three numbers, Jonas Howe, Placide P. Gaudet, Harry Piers, of Halifax, and Hon. Pascal Poirier.

The magazine was not a financial success, its number of paying subscribers, or rather of those who promised to pay being limited to about seven hundred.

As a literary work it was probably the best that had been produced in the Acadian Provinces up to that date, with the possible exception of *Stewart's Quarterly.*

The first volume contained 390 pps., the second 344 pps., and the third 288 pps. The subscription price was $1.50 per annum.

The editor, William Kilby Reynolds, was a writer of marked ability, having a love for historical study. He was careful as to facts and wielding a graceful pen. He died in 1902.

We now note a new era in Acadian Magazine literature, one where the illustrations from being an occasional embellishment, became a feature of the magazine. In March, 1899, Vol. I, No. 1, of *The Prince Edward Island Magazine,* edited and published by Mr. Archibald Irwin, of Charlottetown, P.E.I., made its appearance as a

monthly, and from the outset it appears to have been a success. This volume contains 436 pages of reading matter and is liberally illustrated. A great variety of topics by many writers are touched upon, the object, apparently, being to make the work of such a character as to appeal to the natives of the Island, of various classes and individuality, whether at home or abroad.

At the end of this volume we find the following brief editorial reference to the work of the magazine and its success during its first year:—

"With this issue is completed Volume I, of *The Prince Edward Island Magazine.* To those whose articles have filled our pages we tender here our sincere thanks. It will doubtless make them glad to know that the success which has come to the magazine, is much greater than was expected when the first number was published, and this we attribute to the quality of the work of our kind contributors." The first volume as before stated, contained 436 pages of well written and well illustrated articles of good variety. The magazine has now completed its fourth year with no apparent diminution of vigor or interest, and this may probably be accepted as sufficient evidence that its progress has been satisfactory both to the public and to the publisher.

Among the contributors to this magazine, Lawrence W. Watson is entitled to a foremost place, his articles on "The origin of the Malicites," "Charlottetown in the Olden Times," "Autumn Flowers" and "Among our Orchids" all appearing in the first volume, and all being worthy of preservation.

W. L. Cotton deals with John Hunter Duvar and his poems. Mr. Duvar will be well remembered by the readers of *Stewart's Quarterly* and *The Maritime Monthly* as a verse writer of ability.

Professor John Craven was a contributor of merit to Vols. 1 and 2, his principal articles being "Port Lajoie," "The Island of St. John in 1721," and "The first settlement of Three Rivers," as well as some verses.

Rev. Maurice Swabey, a Church of England clergyman now deceased, was an occasional writer, and in addition to some of his poems, there appeared, "Fox Hunting in Prince Edward Island in 1840-45." Mr. Swabey was a man of marked ability, if somewhat eccentric, and he resided for a time in Prince Edward Island, and afterwards in New Brunswick. In 1878, he published in London, England, a small volume of poems of about 70 pages in extent, entitled "Voices from Abegweet, or The Home on the Wave."

Abegweet, as we all know, was the Indian name for Prince Edward Island. After leaving New Brunswick, Mr. Swabey became Vicar of

St. Thomas, Exeter, England, at which place he remained until his death during the past year, 1902.

Mr. Swabey's [1] memory is held in high esteem by many of his old parishioners at St. Jude's Church, Carleton, St. John, N.B., and many anecdotes are related regarding him. Careless as to appearances and an earnest conversationalist, we can almost see him now, as upon one occasion he drove off the Carleton Ferry at low tide up the steep floats, in a conveyance perhaps akin to the Wonderful One-Hoss-Shay described by Oliver Wendell Holmes, in his poem entitled the Vicar of Bray, when on the

> First of November, fifty-five;
> This morning the parson takes a drive,
> Now, small boys, get out of the way,
> Here comes the wonderful one-hoss-shay
> Drawn by a rat-tailed, ewe-neck'd bay,
> "Huddup!" said the parson, off went they.

Yes, off the boat and up the floats, the rat-tailed bay wandering at his own will over the floats, now with one wheel dangerously near the edge, almost over the water, the next moment the other wheel mounting high upon the log which divides the footpath from the carriage way, a piece of an old clothes line for reins, with harness held together with twine, board nails and pieces of wire, the parson earnestly discoursing all the while, and his companion in momentary dread of a fatality, or again in the words of Holmes,

> "First a shiver, and then a thrill,"
> Then something decidedly like a spill."

But to resume our subject after a somewhat lengthy digression. In the issue for July, 1901, the editor of *The Prince Edward Island Magazine* pays a high tribute to E. L. M., whose series of five articles on Charlottetown fifty years ago, has much value as a contribution to the historical literature of the Island, in part in the following words:—

"For the first time since the establishment of this magazine, we are called upon to announce the death of a contributor, and to testify as far as the poor words at our command will allow, to the worth of a most estimable and well-beloved woman. To many of our readers the identity of the writer, E. L. M. may have been known. But it was not known to all, that the initials were those of Elizabeth L. MacDonald, the wife of Hon. Senator A. D. MacDonald of Charlottetown. The majority of our readers will, we fell sure, mourn her death. By the

[1] A short biographical sketch of Mr. Swabey, with portrait, about 1860, will be found in *Acadiensis*, Volume II., No. 4, pp. 245-8.

editor of this magazine, her loss is keenly felt; her interest in the publication was sincere and sympathetic, and her assistance, so generously given, was of great value."

Other contributors of note were Jeremiah S. Clark, who is an authority on Indian affairs as well as a good writer of verse, and enjoys more than a local reputation, Hon. A. B. Warburton, D.C.L., who contributed several valuable articles on educational matters; and May Carrol, a writer of verse who contributed some good poetry, notably "A Life," "A Boating Song," "An Easter Lily."

In the later numbers of the magazine "Tommy Hawke" becomes quite a feature contributing a cleverly written series of short articles and paragraphs, dealing in a humorous vein with almost any subject, from the state of the weather, to the Sunday School Picnic.

About the same size as the magazine last mentioned, but typographically and in the quality of its illustrations very much inferior to it, was *The Cape Breton Magazine,* Vol. 1, No. 1, of which bears date September, 1901, containing fifty pages of printed matter. The price was ten cents per copy, or $1.00 a year. Following the September issue appeared a second issue of 50 pages described as the October and November issue, Nos. 2 and 3. After this, there appeared in December of the same year, Vol. 1, No. 4, and in March, 1902, an issue styled Vol. 1, Nos. 5, 6 and 7. In the last mentioned issue the announcement was made that the magazine would appear in future as *The Cape Breton and Nova Scotia Magazine,* but no future issues were forthcoming.

It is stated that the publisher lost heavily by the large fire at Sydney, and a well known critic expresses the opinion that the publisher lacked business ability, and that the later issues of the magazine afforded a good illustration of how not to read proof.

The editor of the magazine was Robert P. Bell, and it was published by the Bell Printing and Publishing Co., P. O. Box 592, Sydney, Cape Breton.

The articles of interest to students of local history contained in *The Cape Breton Magazine* were "The Catastrophe at Swivel Point," by J. Rhetland: "An Idyll of Acadia," by Rev. C. W. Vernon. "First Seventy Years of St. George's," an exceedingly valuable paper by the Venerable Archdeacon Smith, D.D.: and "The Old Cape Breton Christmas," by John J. McCabe.

It is seldom that the promoter of a magazine is able to summon to his assistance such an array of talent of recognized ability, within the sphere if his own immediate relationship, as was the case with Mr. Theodore Roberts, when in November, of 1902, he commenced at

Fredericton, N.B., the issue of "The Kit-Bag,"[1] In the three numbers already issued we find contributions in prose and verse by Charles G. D. Roberts, poet and novelist now of the city of New York, and Elizabeth Roberts MacDonald of Fredericton, a verse writer of ability, brother and sister respectively to the editor. Among the contributors were also Bliss Carman, who needs no introduction to Acadian readers, and his sister Jean M. Ganong, wife of Professor W. F. Ganong, Ph.D. of Smith College, Northampton, Massachusetts, both of them first cousins to the editor.

Mrs. Ganong contributed a short story to the second issue of the magazine entitled "The Wall-Flower," a love story that is somewhat away from the stereotyped form, with which magazine readers have been familiar for generations.

Theodore Roberts is himself a writer of verse of no mean ability, many of his best productions having a freedom, an easy swing that is not mere jingle, and a poetry of rythm that is charming.

Having previously edited *The Newfoundland Magazine*, published at St. John's, Newfoundland, and having other experience gained in professional editorial work elsewhere, Mr. Roberts did not, by any means enter the arena of Acadian Magazine literature as a novice or an amateur, with much to learn and many impracticable ideals to overcome. In fact before making his bow to the literary public, to whom he looked for support in the new enterprise, the announcement was made, through the medium of advance notices in the press, that *The Kit-Bag* would contain no amateur work, and that its readers might depend upon that magazine containing only the finished work of professional writers.

Having thus deliberately cut himself off from association with, or assistance from amateur writers, of whom there are not a few of ability in the Acadian Provinces, it remains to be seen whether Mr. Roberts will be able to maintain that standard of freshness and originality which is essential to the success of any magazine.

If the work of professional writers only is to be utilized, a fund must be created out of which to remunerate such contributors, as with them fresh ideas and well written stories or verses mean dollars. However, willing they may be at the outset to help along a good cause, they cannot afford to continue without remuneration to contribute the result of their best thought.

The first number of *The Kit-Bag* contained 32 pages of well written matter, the third contains but twelve, while the price has been increased

[1] *The Kit-Bag* has now ceased to exist, three numbers only having been published. Its editor, Mr. Theodore Roberts, has removed to Bermuda, where he intends to reside for the winter. D. R. J., 1903.

from ten to fifteen cents per copy, the subscription rate still remaining at $1.00 a year.

It is to be hoped, for the credit of this part of Canada that this magazine may continue to flourish as it deserves to do, and long continue to be a credit to its editor and his assistants.

Another late effort in the realm of Acadian literature is a magazine entitled *Neith*, published monthly at ten cents a copy or $1.00 a year, by A. B. Walker, B.A., LL.B., Barrister at Law, of St. John, N.B., the only coloured barrister in New Brunswick. The first issue was dated February 1903, and its advent had been looked for with much curiosity by the literary coterie of St. John. In fact it may be stated that honours were easy as between *Neith* and the Local Election for the House of Assembly. The coming of each was anticipated for some time and the public curiosity having now been satisfied as to both issues, the people of that city are seeking a new sensation.

The first issue of *Neith* contained 60 pages of printed matter upon various topics, chiefly devoted to the negro race, and its alleged wrongs. Portraits of several of the contributors appear, but the editor has modestly withheld his own for a subsequent issue. That of his son appears at the head of an article entitled "Pleasures of the Imagination" of which he is the alleged writer. This article contains a smoothness of composition, a grace of words, and a sequence of thought that is really surprising in a writer not yet out of his boyhood.

The Rev. W. O. Raymond, M.A., LL.D., who is well known as an authority on local history has contributed an interesting article entitled "The Negro in New Brunswick," while Dr. Dole, who has been before alluded to, as one who has cheerfully contributed gratuitously to the assistance of many impecunious promotors of local literary enterprises, graces its pages with a song.

We now come to the last of the magazines which will be mentioned in this paper, namely *Acadiensis*.

The origin of the name is too familiar to need any explanation to such an audience as this.

It has been the chief aim of its promotor to make the publication of such a character that neither he nor those who have so graciously contributed to its literary success, should have any cause to be ashamed. How far he may have succeeded in reaching towards this ideal, is for others than himself to judge.

The magazine appears to have aroused more than a local interest, and assurances are not wanting that its coming is looked forward to with pleasurable anticipation in some of the centres of culture, both in Europe and America.

Local history, and the writings of local men of letters are what are particularly sought after. No short stories or similar works of fiction having been admitted to its pages, it cannot, of course, compete with the so-called popular magazines of the day, either in price or embellishments. It, nevertheless, represents the most ambitious effort at an illustrated magazine that has yet been produced in the Maritime Provinces of Canada.

There has been no dearth of literary material from which to draw, but careful editing is essential to the successful continuation of the work.

The task of magazine editing, even in an amateurish way, while it is exacting work, accompanied by many petty annoyances, is not without its compensating pleasures. The many kindly letters received, the friendly helps from unexpected directions, the interest in the work displayed by persons whom the editor has never seen, are all sources of pleasure and gratification.

What the future of *Acadiensis* is to be, it is difficult to say. A little effort on the part of those who have both the material and the ability at their command, to contribute a desirable article, even once a year, or a kind word to a neighbour on behalf of the enterprise, would be of material assistance to those who have borne the heat and burthen of the day, and carried the work along to its present stage of development.

A strong effort has been put forth to make the work of value and interest to Nova Scotians particularly, and while this effort has been partially successful, it must be remembered that to make the work valuable and interesting to the people of that province, it must have the literary support and friendly co-operation of their own people.

This desired assistance once secured, there could be little doubt that the magazine could be carried on successfully, and do a useful work for many years, a work of which we Acadians who love our country, its traditions and its history, would have no reason to be ashamed.

It is perhaps worthy of mention that copies of *Acadiensis* may be found in nearly all the Provincial libraries throughout Canada; in the Lenox Library, Fifth Avenue, New York; in the libraries of the Senate and House of Commons at Ottawa; in the New York State Library at Albany; The University Library at Cambridge, England; the Library of the British Museum; the Royal Academy of History at Madrid, and in many others of less importance.

While the subscription list is not a large one, the magazine reaches homes on the American continent, scattered from the Atlantic to the Pacific coasts, and from the Klondyke to Southern California. The list

of European subscribers although small, also shows a wide sphere of influence.

In the Salutatory article in which *Acadiensis* was introduced to the reading public, one or two points were touched upon which, it was hoped, would have aroused some discussion among the writers for the press throughout our three provinces. Among others might be mentioned the Union of the Maritime Provinces of Canada into one province governed by men of broad minds and large ideas.

This is doubtless an old subject to many readers, but it is one that is eventually destined to again return to prominence. There are many ways in which such a union would be of inestimable benefit to the people of our provinces.

Viewing the matter from a broad standpoint, it is difficult to see in what manner any of the Maritime Provinces could fail to profit by much an amalgamation.

We are, as at present constituted a divided people, having similar aspirations, hopes and ideals, whether political, literary or otherwise. We are all working, each in our own small way, for pretty much the same objects, the advancement of education, the promotion of trade and commerce, the upraising of the pursuit of agriculture as a means of livelihood, and lastly for the upholding of the supremacy of the Empire on the oceans of the world.

The Maritime Provinces have produced, and are now represented in the parliament of Canada by some of the most able men in this fair Dominion, yet these provinces do not command that position in the eyes of the people of their country as a whole, to which by reason of their history, their geographical position, the character, ability and integrity of their sons and daughters, they are justly entitled. Neither do our literary men receive such recognition as is their due by reason of their work and their accomplishments.

Last year there was published at St. John, an historical work of national importance, namely the Winslow papers, edited by the Rev. W. O. Raymond, and yet two publications issued in the Upper Provinces which profess to give an epitome of the historical publications of Canada during the year, contained no mention of it.

Ontario claims to be the literary centre of Canada, yet the city of Halifax is, in point of settlement, older by many years than is the city of Toronto. The city of St. John was incorporated half a century before the cities of Toronto and Montreal. King's College, Windsor, has been producing able men of letters for over a century, and we have many other institutions of learning of which we have no reason to be ashamed.

A house divided against itself cannot stand. Three provinces having common interests, torn asunder by petty jealousies, envy and rivalry, cannot expect to command that respect in the Council Halls of the Dominion, which would be their lot were they to send their representatives forward, as voicing unitedly the will and sentiments of a million of people.

Putting aside all differences, standing shoulder to shoulder, and presenting a united front, there is no reason why, before the present century shall have run its course, and a century is but as yesterday in the history of an Empire, there is no reason, I reiterate, why the brightest diadem in the crown of the fairest daughter of the greatest Empire that has been, should not be known to the world as the Province of Acadia.

Some Acadian Magazines.

Note.— Several of the works included in the following list are known to the writer only by title, and consequently have not been alluded to in the preceding article.

Nova Scotia Magazine, volume 1-5, Halifax, 1789-92.

Nova Scotia and *New Brunswick* or *Historical, Literary, Theological and Miscellaneous Repository,* Halifax, 1806.

Acadian Magazine or Literary Mirror, vols. 1-2, Halifax, 1826-8.

Youth's Companion, Dr. James Paterson. 1823-4-5. 3 vols. Henry Chubb, Printer.

The New Brunswick Religious and Literary Journal, volume 1 complete, and volume II., Nos. 1-6, all published, 4to,462 pages in all. Alexander McLeod, St. John, N.B., 1829. Only copy known is in the Toronto Public Library.

Halifax Monthly Magazine, vols. 1-3, Halifax, 1830-3.

The Two Penny Magazine, St. John, N.B. George Blatch, Ed., 1834. Weekly, soon abandoned.

Mayflower, or *Ladies' Acadian Newspaper* (monthly), vol. I., Halifax, 1851.

The Amaranth, vol. 1-3, 1841-2, St. John, N.B. Robert Shives, Ed.

The Nova Scotia New Monthly Magazine, 1842. Simson & Kirk, Halifax, Publishers. 8s. 6d. per annum.

The Wreath. Thos. Hill, Ed. 1845. One number, Doak & Hill, Fredericton, Ptrs.

The Progress Magazine, 1866. One copy. Thos. Kirwin, Ed. P.E.I.

The Provincial, or Halifax Monthly Magazine, Halifax, 1852-3. Printed by James Bowes & Son, and edited by Wm. Lawson, Halifax. N.S.

Stewart's Quarterly, St. John, N.B., 5 vols., 1867-72. George Stewart, Jr., Ed.

Maritime Monthly, St. John, 1873; 5 vols., 6 Nos. each. H. L. Spencer and Rev. James Bennett, D.D., editors. J. & A. McMillan, printers.

The British North American Wesleyan Methodist Magazine. "Published monthly by connexional authority." Vol. I., sixteen numbers, Sept., 1840 to Dec., 1841, inclusive; vols. II. to IV., 1842-4, 12 Nos. each; vol. V., June, 1846, and May, 1847.

The Mount Allison Academic Gazette, No. 1, dated Dec., 1853.

The Mount Allison Gazette, New Series. No. 1, June, 1863; No. 2, Dec., 1863. Two issues only.

The Eurhetorian Argosy, vol. I., Jan.-June, 1875. Succeeding vols. each contained eight Nos. Still in existence and known as the *Argosy*.

The Parish School Advocate, and Family Instructor for N.S., N.B., and P.E.I. No. I., Jan., 1858. Ed. by Alex. Munro.

The Instructor for N.S., N.B., and P.E.I. Ed. by Alex. Munro, of Bay Verte, N.B. St. John, 1860, 3 vols., more perhaps. "Devoted to Education, Agriculture and General Intelligence." Three numbers of this publication which seems very little known are in the possession of W. F. Ganong, Ph.D., Northampton, Mass.

The Schoolmaster Abroad. Samuel Miller, St. John, N.B. Two or three numbers, 1863. H. Chubb & Co., Printers.

The University Monthly, published by the students of the University of New Brunswick, Fredericton. First No. Vol. I. No. 1, March, 1882. Now in its 23rd year.

Wollestook Gazette, published monthly in connection with St. John Grammar School Debating Society, St. John, N.B. First No. Vol. I., No. 1, Sept. 1st, 1882. Vols 1-2, 1882-3 and 1883-4.

The Guardian, 1860, Jan.-Sept., 9 Nos. only. Edward Manning and R. Aitkin, editors. Barnes & Co., printers, St. John, N.B.

The Stamp Collectors' Monthly Gazette. George Stewart, Ed. Pub., St. John, N.B. Withdrawn in 1867.

The New Brunswick Journal of Education, 1 vol., St. John, N.B., 1886. (Predecessor of Educational Review.) Ed., George U. Hay, fortnightly, for one year.

Educational Review. George U. Hay, Ph.D., and A. H. McKay, of Halifax, editors, 1887, 15 vols. Barnes & Co., printers.

Kings College Record, Windsor, N.S., 1887, 25 vols.; 215 issues to Dec., 1902, inclusive. Published by the Undergraduates of the University of Kings College, Windsor.

Canada, vol. 1-2, 1891-2, Benton, N.B. Matthew Richey Knight, Ed. and Pub. "A monthly journal of Religion, Patriotism, Science and Literature."

Nova Scotia Illustrated, Halifax., N.S. 20 pp., No. 1, Apr., 1895.

The Occasional Magazine, Halifax, N.S. No. 1, Apr., 1895, 3 Nos.

The New Brunswick Magazine, St. John, N.B. Vols. 1-3, 1898-99. William Kilby Reynolds, editor. John Bowes, printer.

The Prince Edward Island Magazine, Charlottetown. No. 1, vol. I., March, 1899. Still in existence.

Cape Breton Magazine, Sydney, C.B. 4 Nos. issued, Sept., 1901, Mar., 1902. Robert P. Bell, editor.

The Kit-Bag, Fredericton, N.B. First number, Nov., 1902. Only 3 numbers issued. Theodore Roberts, editor.

Neith, St. John, N.B. First issue, Mar., 1903, A. B. Walker, B.A., editor. Patterson & Co., printers.

Acadiensis, St. John, N.B. Vols. 1-2-3, 1901-2-3. David Russell Jack, editor. Barnes & Co., printers.

XI.—*Latest Lights on the Cabot Controversy.*

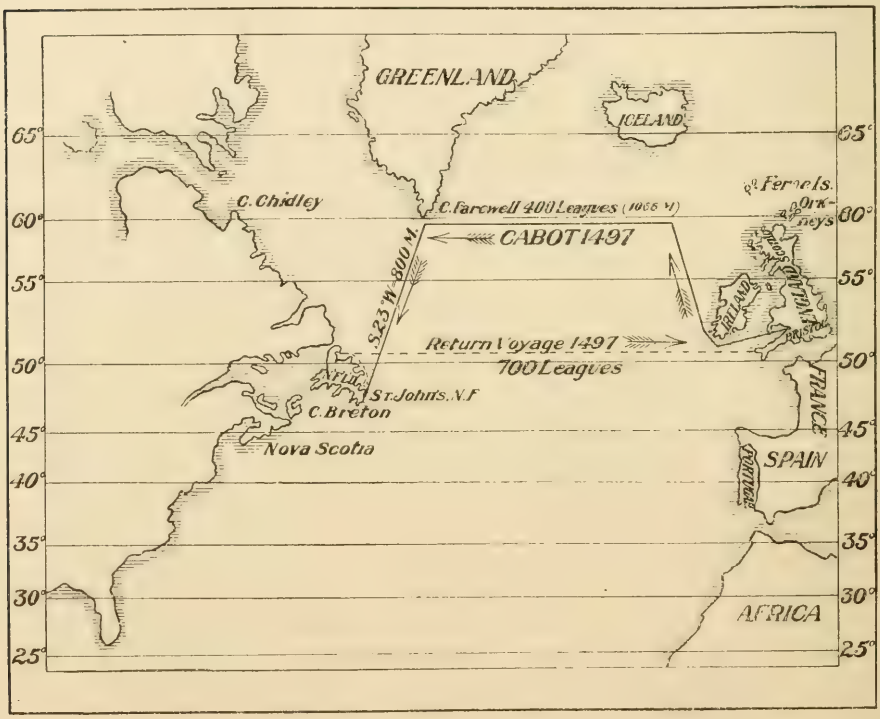
By RT. REV. BISHOP M. F. HOWLEY.

(Read May 19, 1903.)

Mr. Harrisse in his latest work "John and Sebastian Cabot," essays at great length to prove two points: One negative, *viz.*, that "June could not be the date of Cabot's landfall." The other positive, *viz.*, that the site of the landfall was somewhere on the coast of Labrador.

I will attack the former position first, and I think he can be easily routed from it. The arguments by which he endeavours to support it, are all based on a mistaken foundation. He argues thus (p. 63) : Cabot left England somewhere about the beginning of May (1497). From a Bristol MS., we learn that the expedition started on the 2nd of May. Harrise says "unfortunately Bristollian MSS. are not always to be trusted. He allows, however, from other sources, Pasqualigo, etc., that the expedition sailed sometime early in May. We know for certain that Cabot had returned and was in London at least as early as the 10th day of August following, "which implies that he reached Bristol about five days before. This leaves only forty-two days between the arrival of Cabot in sight of the New World (supposing him to have sighted it on June 24th) and his return to England." He then goes on to argue that "since it took him *fifty-two days* (from 2nd of May to 24th of June) to make the outward voyage, and since they must have devoted some time to refit or repair their diminutive craft, as well as to take in wood and water and renew the stock of victuals, which could only be done by hunting and salting game"; and again "since Pasqualigo asserts that they coasted three hundred leagues, which is corroborated by Ayala who saw the map which John Cabot made, of the lands newly discovered. . . . How can all this have been accomplished in the limited space of time which the alleged landfall on June 24th, leaves Cabot before returning to England? If we suppose that owing to the westerly winds and gulf stream, he effected the homeward voyage in *one-third* less time than was required for the same passage when outward bound, that is thirty-four days instead of fifty-two, as he was already back in Bristol on the 5th of August, he would have taken necessary rest, made the indispensable repairs, effected landings, renewed his provisions, and coasted nine hundred miles, all within eight days!" (p. 64) If such argumentation had a shadow of exactitude in it, it would merit the note of admiration with

which the learned author closes his climax, but unfortunately as I hope to show, it is based upon a most illusory and illogical foundation. It is true that between the date admitted by all for Cabot's departure from Bristol (May 2nd) and June 24th, the date we hold to have been that of the landfall, there are fifty-two days. But it is quite a mistake to argue that Cabot would have taken two-thirds of that time, or thirty-four days, to return. In order to prove this, it will be necessary to consider the circumstances connected with the outward voyage.



In the first place, we know for certain, that Cabot did not steer a straight course for the western world, but on the contrary having sailed out through Bristol and the Irish channels and rounded Cape Clear, he bent his course northward on the route to Iceland. He kept this route for some days, sailing northward along the west shore of Ireland and Scotland. We learn this fact from the letter of Don Raimondo Soncini, Ambassador of the Duke of Milan, written on the 18th December, 1497, from London to Ludovico il Moro, Duke of Milan. This document is of undoubted authority. The original is among the "Corrispondenza Ducale" in Milan, and a copy exists in the British Museum. These are the words referring to our present question. . . .

partitosi da Bristo, porto occidentale et poi, alzatosi verso el septentrione comminciô ad navigare ala parte orientale (i.e., occidentale) lasciandosi (fra qualche giorni) la tramontana a mano dritta."

These statements though meagre, are of the utmost importance. We learn from them that Cabot did not sail out directly westward across the Atlantic Ocean into the unknown seas, but crept along northward on the well-known and well-beaten track to Iceland "for some days." I say this course to Iceland was a well-known one to the merchants and navigators of Bristol. "Already since 1412," writes Leonce Goyetche (Hist. of St. Jean de Luz), whale fishers had penetrated as far as Iceland." Towards the 3rd quarter of the XV Century (1475), the English traded with Iceland and a large commerce was maintained with it by Bristol." (Justin Winsor; Columbus, p. 138) Soncini also states that there was at this time "grandissima mercantia di pesci coll' Islanda." Cabot was at this time one of the principal captains sailing out of Bristol, and no doubt would have made several voyages to Iceland.

We do not know how far Cabot sailed on this northern course, before striking out to the westward, but if we take the expression of Soncini, "for some days," in its ordinary acceptation of, say "three or four days," we can make an approximate guess at the distance. The voyagers on their return home, stated that the land discovered was about seven hundred leagues distant, and that now that they knew where to go, they could go there in fifteen days. (Soncini.) This statement must have been based on their actual observations and experience, and from it we argue as follows: We know that the distance from Newfoundland to Bristol is about 1,900 miles, we also know that the league of Cabot's time was a little over $2\frac{2}{3}$ miles. Seven hundred leagues then, would equal about 1,900 miles more or less. No other part of North America bears this relation to England; and of no other part but Newfoundland or Labrador could such a statement be made. Secondly, by a simple calculation we find that if they could make 700 leagues or 1,900 miles in 15 days, their average speed would be about $5\frac{1}{2}$ to 6 knots an hour, or a little over 130 miles a day, which is very good sailing. If, then, we apply this scale to the northern detour of Cabot and say he sailed northward for four days, he would have made about 530 miles or $8\frac{1}{2}$ degrees, and would be in the latitude of $60\frac{1}{2}$ degrees N. In other words, he would be practically in the latitude of Cape Farewell in Greenland, or of Cape Chidley in Labrador, and this is corroborated by the Historian Gomara, who says Cabot sailed north till he came to the latitude of the "Cusp of Labrador." He took the route to Iceland "until he came to the latitude of the Cape of Labrador, until he reached the *fifty-eighth degree*

or more." The cusp of Labrador, as he very appropriately calls it, is Cape Chidley, and is a little above sixty degrees north latitude, ($60\frac{1}{2}°$). Turning then westward, he struck out bodly for the New World. We must bear in mind that Cabot's desire and intention was, to strike land as far to the northward as possible, hoping to find a passage thence to Cathay. Hence he would naturally make land first at Cape Farewell in Greenland, at about 400 leagues distant, and thus is verified the statement of those writers who tell us that Cabot found his new land at 400 leagues. But he did not stop there, he pushed onward another 300 leagues till he made his veritable landfall at 700 leagues from Europe. To state where that landfall was, is not the object of the present point of my argument. I am now only showing how illogical it is for Mr. Harrisse to make any comparison between this round-about voyage and the fair and straight voyage home. Having passed the Cape of Farewell, they would after a while be taken in charge by the Arctic current and carried towards the south and westward, in spite of any efforts of theirs to keep towards the northwest. I will return to this point further on. The only conclusion I wish to draw at present is, that Harrisse's argument is entirely false, and that there is no comparison to be made between the long and straggling voyage out against head winds and many difficulties, of which Soncini says "*avendo errato assai*" "having wandered a great deal"; and the direct voyage home.

From the statement of the voyagers after their return, viz., that "now that we know where to go, we can go there in fifteen days," (Soncini), I think that we are justified in believing that they must have made the journey home in that number of days. It was quite possible, it would be a very good passage even at the present day, but it is constantly done. With a very favourable time the voyage is now frequently done in *ten* days by ordinary sailing vessels. I do not mean to say that Cabot's men were right in thinking that they could come out again to the new land in fifteen days. That is another matter, and I believe they were mistaken. Theoretically, and considering simply the distance and the average speed of their ships under favourable circumstances, it *could be done.* But they were evidently not aware of the fact that *practically* owing to a prevalence of westerly winds, currents, etc., the voyage out, is always nearly twice as long as the voyage home.

To show that this estimate of fifteen days is not an exaggerated one, but was quite an ordinary average voyage, I may here recall two voyages which took place not very long after the time of Cabot, and of which we have a certain knowledge. I allude to those of Jacques Cartier in 1534 and 1536, about thirty-seven years after Cabot's first

voyage. In 1534 Cartier left Blanc Sablon, in the Gulf of St. Lawrence on the 15th August, late in the day, probably towards evening, and arrived in St. Malo, on the 5th day of September. That would give about twenty days. But it is nearly three hundred miles further than the voyage from the east coast of Newfoundland, and, moreover, they had three days of dreadful storm and head winds, which reduces the voyage to seventeen days. But the voyage of 1536 is more to the point. Cartier left the harbour of Renouse, near Cape Race, on the east coast of Newfoundland on the 19th of June, in the evening, and arrived at St. Malo on July 6th, that is to say in *sixteen days!* But though the "homeward" voyage could be done in fifteen or sixteen days it is not so with the "outward" voyage, as I have said. Now then, they were home in Bristol, according to Harrisse's calculation on the 5th of August. If they made the return voyage in fifteen days they would have left the New-found-land on July 21st, and having in our supposition made land on June 24th, they would have at least twenty-six days of sojourn in the New-land instead of *eight* days only as Harrisse's argues.

Now, could they do all that is required by facts in 26 days? I maintain that they undoubtedly could. As to "refitting and repairing their craft"—taking wood and water. That would not require more than three or four days at most. The idea of "renewing their stock of victuals, which could only be done by hunting and salting game," is purely gratuitous. They may no doubt, partly for amusement, have done some hunting while the men were repairing the ship. They could also fish as much as they wished, while coasting or harbouring. But we have no reason to suppose that they were short of provisions. The whole voyage only lasted a little over three months. We know that on the second voyage of Cabot, made in the following year 1498, the ships were fitted out for a twelve months' voyage. We have reason to doubt that the same precaution had been taken on this occasion; particularly when we remember the long delay of fourteen months consumed in preparing and fitting out for this first voyage. Let us then allow a week for resting, repairing, taking wood and water, fishing and hunting, etc., and we have still 20 days for coasting along the shore, three hundred leagues. According to our calculation already made, 300 leagues would be about 800 miles. If they merely coasted along shore by daylight, harbouring at night; since at that season of the year in Newfoundland there are about eighteen hours of daylight out of the twenty-four, they could have actually coasted eighteen hundred miles, or nearly eight hundred leagues in twenty days! But we do not suppose that they did so; we give them ample time for entering harbours,

exploring bays and rivers, hunting, etc., and to do three hundred leagues in twenty days, they would only require to have sailed fifteen leagues or thirty-five miles a day, which would have occupied only six hours and a half out of the twenty-four hours. All the rest of the time, namely eighteen hours out of the twenty-four, might have been employed in sleeping, hunting and exploring. I think, then, I have clearly shown that there is no foundation in Harrisse's argument, that the 24th of June could not have been the date of the landfall, and that nothing brought forward by him can shake the strong and unbroken chain of tradition, which has always held that Cabot made his landfall on the 24th of June, and called the land found by him by the name of St. John, after the great precursor, the Baptist, whose festival the church celebrates on that day.

It is not necessary that I should here bring forward any proof of this tradition. No one, I think, has ever before placed it in doubt, and it is to be regretted that a writer of such learning and industry as Harrisse, should have broached such an untenable theory. I will now proceed to prove the second point of my thesis, namely, that the site of the landfall was not Labrador, but St. John's, Newfoundland. Though various points of the north eastern sea-board of America have been championed by different writers as the site of the landfall, I think the many differing theories may be reduced to two main heads or classes: Namely, 1st, those who maintain that the landfall must have been somewhere on the east coast of Newfoundland or Labrador; 2nd, those who believe that Cabot, having passed Cape Race without seeing it or any part of the coast of Newfoundland, drifted onwards some five or six hundred miles further and struck some part of Cape Breton Island or some land in the Gulf of St. Lawrence.

This latter theory is so absolutely impossible; so utterly irreconcilable with the distances and courses already mentioned, and with the facts which we now know concerning this voyage, that I cannot conceive how any person could for a moment maintain it. I pass it by without delaying to refute it. I will merely say that the distance instead of seven hundred leagues would be more than nine hundred, that it could not possibly be done in fifteen days; that considering the well known fact that Cabot steered northward on the west coast of Ireland till he reached somewhere about the 60th degree of north latitude; then steered westwardly till he made Cape Farewell in Greenland, and still continued trying to make land to the westward, it is a physical impossibility that he could have escaped making either Labrador or some part of Newfoundland. The learned Dr. Dawson, arguing on this point, draws a comparison between the voyages of Columbus

and those of Cabot. He says that Columbus "though sailing in a latitude much further south than Cabot, and one in which the variation is slighter, being about one point $11\frac{1}{4}°$ (while that of Cabot, he says, was $17\frac{3}{4}°$) yet when he (Columbus) made his landfall he had dropped some 240 miles south from the latitude of the point of his departure; it is altogether probable that John Cabot, with a point and a half would have dropped some 360 miles to the south of his starting point near Cape Clear, in latitude 53°. This would have carried him south of Cape Race and to the next probable landfall, Cape Breton." With every possible respect to the learned writer, there are many assertions in this argument which I must contravene.

Firstly, The circumstances of the two voyages (Cabot's and Columbus's) are so entirely different in all respects, climate, winds, currents, natural phenomena such as ice, fogs, etc., that no argument *a pari* can at all be admitted.

Secondly, The objective point and the intention of each voyager was entirely different. Cabot, we know, was all the time trying to make northwesterly. His object was to find a nor'west passage to Cathay, and to avoid any possible collision with the more southern discoveries of Columbus, while Columbus, on the contrary, was not bound by any such desire or intention, he had a clear horizon before him with no limit to the arc of his projected discovery, he sailed out westwardly, but we know that several times he altered his course to the southward. On Saturday, September 22nd, he changed his course to W. N. W., on account of a head wind, on the 23rd he again altered it to W. On the 25th they thought they saw land to the S. W. and altered their course to that direction; on the 27th they steered W. again. Again, on October 7th, seeing birds coming from the S. W. they again altered their course to that direction, and continued so till they reached the 24th parallel, when they steered west (Winsor). From all this it will appear that Dr. Dawson is not warranted in arguing that Columbus "dropped (unaware to himself) some 240 miles south of the latitude of his point of departure" on account of the variation of the compass, or of unknown currents, etc. The fact is, he knowingly, deliberately and frequently changed his course to the southward.

Thirdly, It was not so with Cabot. He kept on towards the west and north; we know that his object was to discover the northwest passage, and that he feared to encroach in the least upon the territory explored by Columbus southward. In fact, we know that De Puebla, the Spanish ambassador in London did actually accuse Cabot of having discovered only the lands first found by Columbus and having made a false map so as to make them appear different! Yet, notwithstanding

all Cabot's efforts to keep northerly, he actually (as we shall see) fell southerly some 750 miles before making land.

I have shown already clearly that Cabot started on his western course from a point about 60° north latitude, somewhere to the westward of the Feroë Islands. About 400 leagues west from him, was the southernmost point of Greenland, Cape Farewell. In my "lecture" on this subject I have given good reasons for believing that Cabot was aware of the existence of this land, and that he determined to "make" it, and rounding it, to steer westerly for Cathay. But even if he were not aware of it he could scarcely help "making" it. In proof of this I quoted the example of a practical navigator, the Hon. Captain Cleary who, about fifty years ago (1853), made this very voyage. He left Copenhagen on October 13th, bound for St. John's, Newfoundland. Passing out between the Orkneys and Shetlands, latitude exactly 60° N.

"I tried all I could," he said, "to make southwardly during the passage across, but I could not gain an inch that way. The first land I saw was Cape Farewell, in Greenland. I was then carried south and westward by the Arctic current and never saw land again till I made Signal Hill, at the entrance of St. John's Harbour!" The force of my argument depends so much upon the fact of Cabot's having made Cape Farewell, that I may be pardoned for briefly summarizing here the remarks made at length in my "lecture" already alluded to. We have now most authentic evidence of the discovery and colonization of Greenland, Markland, Helluland and Vinland in the ninth century by the Norsemen, and although these colonies completely failed, yet the Norsemen of Iceland never altogether lost sight of them, and the existence of a land to the westward of Iceland was well known to the learned in Europe, at the time of the voyages of Columbus and Cabot. From the records of the Vatican library, we find that an ecclesiastical connection unbroken for four hundred years was kept up with Greenland. And among the Vatican MSS. is a Brief or Bull of Pope Alexander VI., dated 1492, the very year of Columbus's first voyage, appointing a bishop of the See of Gardar, in Greenland. The existence then of this land was well known, though its exact position and contour were not clearly understood (it scarcely is so yet). In some early maps it is shown as a great peninsula jutting out from the north of Europe, encircling Iceland and running down to latitude 60° in the west of that island. In others, a little later, it is shown as a part of the mainland of America. At all events, its existence was well known to the learned and nautical men of the age and we cannot doubt that Cabot knew of it, and knew that he should have to pass it, going westward.

We now come to consider more closely the exact site of Cabot's landfall. Here, in Newfoundland, we are divided in our opinions, but our divisions are only of a comparatively minor nature. We all hold the theory which I have above placed under the first category, viz., the east coast of Newfoundland or some part of Labrador coast. When writing my "lecture" and obtaining the practical evidence of men like Captain Cleary, I was of opinion that the landfall was at Cape St. John, on the N. E. coast of Newfoundland, exactly in latitude 50° N., and I brought forward many arguments to endeavour to prove that theory. The learned Judge Prowse, K.C., LL.D., stood out strongly for Cape Bonavista; James P. Howley, Esq., F.G.S., and Geological Surveyor of Newfoundland, held for the point of Domino, in Labrador.

Captain Cleary, when asked what he thought of the question of Cabot's landfall, said, "He might have made Labrador coast near Domino or Indian Tickle, or he might have made some point on the N. E. coast of Newfoundland, such as Cape St. John or C. Bonavista. It would depend on the wind. *But he couldn't make Cape Breton* having in view to make land westward of Greenland." Although I brought forward what I considered many strong arguments in favour of my theory of C. St. John, still I must confess I was not fully convinced of the certainty of my case and was still open to conviction, if I should receive any stronger arguments for some other point.

During a voyage across the Atlantic on board the Allan steamer Peruvian, in the summer of 1902, I had some conversations with the amiable and intelligent Captain Rennie, on the question of the Cabot landfall. The subject was new to him. That is to say, he had never given any special attention to it, and he was perfectly unbiassed concerning the point in dispute. He, however, at once took a lively interest in it. I gave him my "lecture" on the subject. He perused it attentively two or three times. Studied it out with his charts and tables, and coming to me, he said emphatically, "I will stake my reputation as a navigator that St. John's, Newfoundland, was the point of the landfall." I was surprised, but overjoyed to hear it, as this would verify the old and favoured tradition, and on receipt of Captain Rennie's argument, together with a map marked by him which he very kindly gave me, I willingly gave up my theory of Cape St. John. The Captain had worked out the case by nautical science and practical knowledge, and then applying his conclusions to the chart, found that the spot indicated was St. John's! The following is the gist of his arguments and observations:

Starting from the hypothesis that Cabot reached Cape Farewell, in Greenland, a fact which, after a perusal of the "lecture," the Captain

admitted to be absolutely out of reach of dispute, he argued as follows:

Between Cape Farewell, in Greenland, and St. John's, Newfoundland, the mean variation, *i.e.*, taking the variation of the half way point of the distance, is, at the present day, or at least will be in 1905, to which date the Admiralty Chart is calculated, $39\frac{1}{2}°$ W.

It has been ascertained by observations extending over many years that there is a gradual decrease in variation. It is different at different points in the ocean, but it is regular. Thus, off the N. W. coast of Scotland and the Orkneys it is a decrease of seven miles every year. In the centre of the Atlantic it is six miles annually, and off the Grand Bank of Newfoundland, five miles per annum. In the region we are now considering, namely, between Greenland and Newfoundland, the annual decrease is four miles. Now, if we consider this decrease as going on regularly since the time of Cabot's voyage (1497) up to the date of the chart (1905), we have the following result: The period of time is four hundred and eight years. This number at four miles per year will give 1,632 miles, or $27\frac{1}{5}°$. The variation, therefore, of the present day is that much less than it was in Cabot's time, consequently, in order to find out the variation in Cabot's time we have to add this amount to the present variation, thus, $32\frac{1}{2}° + 27\frac{1}{5}° = 67^{7}/_{10}°$, or, let us say, $66\frac{3}{4}°$. Cabot, therefore, steering due west by compass from Cape Farewell, would in reality be steering W. $66\frac{3}{4}°$ S., or S. $23\frac{1}{4}°$ W., *i.e.*, S. S. W. This is precisely the true course from Cape Farewell to St. John's! Moreover, the distance is exactly 800 miles, or 300 of Cabot's leagues. It will thus be seen that both course and distance correspond in a marvellous manner to the accounts of Cabot's voyage.

But we have now to account for the effect of the Arctic current. For this we have to allow about two miles an hour for lee-way. Now, sailing as we have seen at the rate of about 130 miles a day, it would take a little over six days to make the distance from Cape Farewell to St. John's, or 144 hours. Allowing two miles an hour for lee-way, this would bring him 288 miles south of his course. But we must remember, firstly, he would not begin to feel the effect of this Arctic current until he had come within some two hundred miles of Newfoundland coast. Hence, we must at once reduce the lee-way by three-quarters or more, say, to about 72 miles.

Secondly, on coming near the Newfoundland coast he would immediately begin to feel the counteracting effect of the great northerly "set" running along the east coast of Newfoundland from Cape Race northerly, the neglect of observing which has been the cause of so many steamers running ashore on our S. E. coast, when endeavouring to round Cape Race, and thinking they were giving it a wide berth.

This current then would entirely counteract and cancel the effect of the Arctic current on Cabot's little ship, so that we may leave out of our calculation the matter of current and lee-way, and so the brave little Matthew would make straight for "the Narrows" of St. John's; and rough old "Signal Hill," the very spot on which we have recently erected the noble "Cabot Tower," was really the first land seen by Cabot. And the spot on which he hoisted the banners of St. George and St. Mark on the 24th June, 1497.[1]

[1] With regard to the statement that Cabot coasted along his *Newfoundland* for 300 leagues (*800 miles*). This is easily accounted for, whether it was southerly or northerly is not stated. I once thought it might have been southerly, on more careful consideration of the arguments heretofore adduced, I now believe it was northerly. Having then rested a week at St. John's they set out on their cruise along the shore, and as they were anxiously looking out for the N. W. passage they would naturally have penetrated to the heads (or bottoms, as we say) of all the great Northern Bays, namely, Conception and Trinity Bay, 50 and 80 miles deep respectively. Then they would scour the inner reaches of Bonavista Bay, Notre Dame Bay, and White Bay, and coast along the *Petit Nord* Peninsula to near the Strait of Belle Isle. By this time they would have coasted fully 800 miles, and thence they set their course for home. It is mentioned that in returning they saw two large islands to starboard. These might be any of the numerous islands off the N. shore of Newfoundland, *e.g.*, the Gray Islands, St. Barbe Islands, Twillingate, or New World Island, Fogo Island, etc., etc.

XII.—*The Copper Currency of the Canadian Banks, 1837-1857.*

By R. W. McLACHLAN.

(Communicated by Dr. S. E. Dawson and read May 19, 1903.)

Trade, which, from early times in the British North American colonies, had suffered from an insufficiency of currency, was still further hampered, during the latter half of the eighteenth century, by the almost total cessation of the coinage of silver at the Royal Mint.[1]

While this scarcity prevailed in the north there was abundance in the south, through the wonderful activity of mints in Spanish America,[2] and some of this abundance found its way northward.

This Spanish coinage, mainly dollars, so came to be the prevailing currency in the British Colonies, and so influenced the circulation that the dollar, in a manner, came to be considered the unit rather than the pound, while many transactions, entered into by the government as well as by individuals were expressed in "Spanish milled dollars." The dollar too was divided into so many shillings and these shillings, although still calculated as twenty to the pound, were based not on the pound sterling but on a standard known as the pound currency. Thus the pound in the colonies was reduced to meet the altered circumstances. The number of the shillings to the dollar varied in the different Colonies; for in Massachusetts it was six, in Pennsylvania seven and a half and in New York eight.

In Nova Scotia, after it came under British rule, a different standard still was adopted, which, from the capital of the province, was called "Halifax Currency." By this currency the dollar was divided into five shillings and ten sixpences which gave it an approach to the decimal system. When this standard was first adopted the dollar was worth four shillings and sixpence sterling; on which rate was based the old par of exchange. But Halifax currency followed the decline in value of the dollar until it was finally fixed in 1837 by the virtual adoption of the gold standard in the United States. Then par of exchange, which had been advanced from time to time, was finally settled at nine and a half, the present rate.

After the revolt of the thirteen colonies, Halifax currency was extended to the old Province of Quebec where, by the way, it is first mentioned in a tentative currency promulgated in an ordinance issued

[1] Only a single silver coinage, and that limited to £55,000 in shillings and sixpences, issued in 1787, was struck between the years 1758 and 1816.

[2] According to law the whole of the extensive products of the silver mines of Mexico and Peru had to be coined before being exported.

by General Murray, the Governor, in 1764.[1] Although the Halifax shilling was then only incidentally mentioned it was not long before the trade without any official recognition settled to do business by this standard and Sir Guy Carleton was left no other alternative than to promulgate it officially. This was done by an ordinance, passed in 1777, which rated the Spanish dollar as worth five shillings.[2]

While this change in the value of the shilling could be easily adjusted to the larger coins, it was impossible to make it fit in with the lesser coins in copper; for a halfpenny sterling could not be made to pass for more than a halfpenny currency whether the shilling circulated for one and a penny or one and threepence. It will thus be seen that any one importing legal copper coin could only do so at a heavy loss while those exporting it stood to make as high as twenty per cent, and even more, for the balance of trade was usually against the province and exchange, as a result, often much above par. Under these circumstances it can readily be understood that little if any legal copper coins remained in the province and that the people had to adopt such makeshifts as best they could to supply change.

Towards the end of the eighteenth century, on the issue of a new British coinage, the old coppers of 1770-1775 were shipped over to Canada and for a time afforded a measure of relief; but, through the ordinary loss by circulation and the increasing demands of a growing population, this supply soon proved insufficient; and, as the stringency became more severe, merchants began to import tokens from England for the use of their own trade. While these were at first of fair size and value and therefore acceptable, soon the element of profit in the business led merchants to reduce the weight of their tokens by almost one half and as their avarice increased to import them in greater and greater quantities until the circulation became loaded down with copper change. This too, notwithstanding the law on the statute-books against "importing or manufacturing spurious or base copper coin." Such was the surfeit in copper change in 1817 that a petition was presented from "divers inhabitants of Quebec" claiming "that there has recently been put into circulation a prodigious quantity of copper of which a large proportion has since become depreciated."[3] A similar petition was presented from Montreal "setting forth" that "the evil has now increased to such an extent as to acquire a speedy and efficacious remedy;"[4] and, although a special committee was appointed

[1] Ordinances for the Province of Quebec, 1767, page 4.

[2] *Ibid.* (2nd series). Quebec, 1777, page 70.

[3] Journals of the House of Assembly of Lower Canada. Quebec, 1817, page 68.

[4] Journals of the House of Assembly of Lower Canada. Quebec, 1817, page 114.

and a number of merchants of Quebec examined regarding the evil, nothing was done save to suggest a more stringent enforcement of the law of 1808 against importing spurious copper coin. This law was simply a revision of the ordinance of 1777 above mentioned. In the Provinces of Upper Canada and Nova Scotia the same evils affected the circulation. In the latter province the government rose to the occasion and grappled with the difficulty by providing a special copper coinage for the province.[1]

As a result of this discrediting of the spurious copper currency, the stringent enforcement of the law against its importation and manufacture and the failure to provide an acceptable form of change, there came another dearth of copper change. Still a remnant of the old halfpence of George III, but which had become so worn as to be hardly legible, continued to circulate, which were the only truly legal copper coin. Now some of the merchants, who for profit were ever ready to provide the necessary change, precluded from importing by the effectual supervision of the customs authorities, started coining for themselves. And taking for their patterns the worn copper coppers in circulation they produced something most barbarous in design and execution. The obverse bore an indistinct head without any inscription and the reverse a hideous caricature for Britannia or an indescribable harp. These nondescripts the illiterate habitants accepted without question while they rejected the well executed "Wellington halfpenny tokens" of the previous decade. That the quantity issued was large is attested by the fact that thirty varieties are known in all stages of indistinctness and degeneracy down to plain discs of copper. Mactaggart thus described the copper circulation of Canada in 1828; "While the *French* keep gabbling about *quinze sous* and *trente sous*, which are perplexing to comprehend every sort of *copper-piece* is an halfpenny. I have no less than 120 different kinds, the greater part of them *old copper coins* of Britain and Merchants' tokens all over the world. If a lot of farthings be taken into a *smithery* and receive a blow from a sledge-hammer on the anvil, they will then be excellent Canadian coppers, or half-pennies."[2]

At a later date, when these imitations of worn coins had become discredited, several tons of an English trade token dated 1812, having the head of George III within a wreath on the obverse and a female seated on a bale of goods on the reverse, were imported by Joseph Tiffin, a prominent merchant of the time. Soon this token was counterfeited and large quantities of such brass imitations were passed

[1] This coinage I have described in a communication to the Royal Society of Canada. See Transactions, Vol. X., section II., page 35.

[2] Three years in Canada, 1826-7-8. By John Mactaggart, London, 1829, Vol. I., page 321.

off on an unsuspecting public together with another base brass token equally rude, dated 1820, bearing the head of George IV on one side and a harp on the other. The latter does not appear to be an imitation but an original design. A number of clandestine mints for the coinage of these tokens were set up not only in Montreal and Quebec, but in some of the more rural districts from which the issue became so enormous that copper formed the bulk of the circulation. The receipts of merchants in this currency at this time often reached from two to three hundred dollars a day. About twenty-five varieties are known of each. This coinage, varied with a sprinkling of the tokens of two firms, J. Shaw & Co., of Quebec, and T. S. Brown & Co., of Montreal, and continued to be received as accepted change until 1836. At that time the currency is described in a memoir "On the Miserable State of the Currency of the British North American Provinces" as follows:—"The miserable coppers which are now in circulation consisting of base coin and tokens of all descriptions and frequently pieces of sheet copper which have never been impressed with any die and do not weigh more than a fourth or a half of the weight of an English halfpenny." [1]

Although innocent traders were the greatest sufferers, none of them made any move to improve matters. It was therefore left to the market hucksters to take the initiative and they became for a time the regulators of the copper currency. From day to day they extended their censorship until few if any copper coins were left in circulation.

At this point the Bank of Montreal came to the rescue of the people and imported a quantity of "Bank tokens" from Birmingham. These were well executed and therefore a great improvement on the miserable brass pieces to which they succeded; and of full weight too. On one side they were impressed with a bouquet emblematic of the three Kingdoms with ears of wheat as indicative of Agriculture, Canada's chief industry, and with maple leaves as representative of Canada. This is the first occasion on a coin that the maple leaf was employed as a Canadian emblem. The value was given in French and, by some mistake of the Birmingham makers, in the plural *un sous*. The name of the Bank is wanting, the inscription being: "Bank token Montreal." As this was not satisfactory to the people, a new token was ordered like the first in every particular, even to the error *sous*, except that the inscription was changed to "Bank of Montreal token."

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[1] "Memoir on the Miserable State of the Currency of the British North American Provinces submitted by R. Carter to Lord Glenelg." Canadian Archives, vol. 24-1, page 96.

About the same time "La Banque du Peuple"[1] issued a coin similar in design but smaller in size and totally different in workmanship and arrangement. The value *un sou* is given correctly. Its place of manufacture was in the town of Belleville, New Jersey, at that time a copper producing centre. As two or three die varieties exist, and as the coin is still quite common a considerable quantity must have been issued.

Shortly after the appearance of the last, "La Banque du Peuple" issued a new *un sou* also of the same general design but differing still more in arrangement. As the letters in the inscription were sunk with a graver instead of punches, which indicates that they were made in a workshop not fully equipped, and as the dies were held by the Bank of Montreal, I have come to the conclusion that this coin was struck in Montreal. Some time before this Joseph Arnault, an engraver, had come out from France and set up his atelier on Craig Street, near Côté. The bouquet on this coin while composed of the same emblems is distinguished by a large maple leaf out of proportion as to size when compared with the other plants. In the wreath too the maple leaves are large and well formed. Much better than on the Belleville made coin. All this would indicate an intense patriotism on the part of some persons connected with the bank. But still farther the introduction of the star and the phrygian cap indicate that they were in sympathy with the movement for the independence of Canada and with the rebellion of 1837. From this fact the coin is called the "Rebellion token." It is much scarcer than any of the other *un sou* bank tokens.

The banks had hardly got their tokens well into circulation before imitations began to appear, which imitations were, of course, much lighter than the regular bank issues having evidently been imported for profit and not "for the convenience of trade." A number of Montreal firms took part in the introduction. Among the more prominent of whom was Dexter Chapin, an exchange broker. The quantity thus imported far exceeded that of the banks. So great was it, indeed that over forty varieties are known. Some of these varieties were struck in Birmingham, others in the United States and a few in Montreal; and curiously enough many by the same makers as furnished the bank tokens. This fact is proved with respect to those from Birmingham by the one variety, which bears on the reverse a bouquet exactly like that on the Bank of Montreal token. All the other varieties from Birmingham are intimately connected with each other by style of workmanship and interchange of dies. And yet all express *un sou* correctly while none of them are of such fine workmanship as the regular bank

[1] This Bank not having received its charter was at that time doing business under the name of Jacob de Witte, Viger & Cie.

issue. Two varieties also of the false tokens from Belleville, N. J., reproduce the same bouquet as appears on "La Banque du Peuple" *sou*. The similarity of the *sou* made by Joseph Arnault, to one of the clandestine issue and the fact that many specimens occur struck over the Canadian made brass tokens bearing dates 1812 and 1820, prove that at least one variety of the *un sou* token was made in Montreal, and that Arnault thus tried to rehabilitate the discarded tokens by thus giving them a new dress.

Perhaps it was this incident that brought about the condemnation of the *un sous*, which came again from the hucksters. These self constituted censors of the Copper Currency excepted the issue of the Bank of Montreal from the general condemnation; and, illiterate though they were, the mark by which they determined the genuine from the spurious was the error of the Birmingham maker. This condemnation would appear to have involved the issue of the "La Banque du Peuple."

This sudden withdrawal of such a large quantity of copper coin again created a dearth in small change; which dearth set the people more ardently seeking for an adequate and permanent relief and towards which steps were taken early in 1837, both in Quebec and Montreal. I have fortunately been able to lay my hands on a number of documents bearing on this subject, on which I have been able to base the following deductions. These documents have been culled from the minute book of directors of the Bank of Montreal, from the Archives of the Montreal Court House, from the Archives department, at Ottawa, and from the State book, Ottawa. Some important letters are missing still there is enough to settle many disputed points.

One of the documents states that a resolution passed at a "general special session of the peace," held at Quebec, in June, 1837, asked the Governor in Council to provide a supply of copper change as it was greatly needed.[1] Although this resolution was favourably reported on by the Council suggesting the importing of a quantity of British halfpence, the suggestion being impracticable, no action was then taken. But a more efficient remedy was set under way at Montreal by the Bank of Montreal; for under date of June 9th, 1837, the following item is minuted: "The subject of the Copper Coinage was again discussed. The cashier was directed to import a quantity and obtain the concurrance of the other banks."[2] An order for £5,000 worth of this coin was entrusted to Albert Furniss[3] provided he secured concurrence of

[1] Appendix F, No. 2.

[2] Appendix C. No earlier minute was accessible to me.

[3] Albert Furniss was a prominent and enterprising business man of that time, being engaged in the metal trade. He was also connected with a num-

the other banks. Otherwise it was to be for half the amount. But from the occurrence of the names of three other banks on the tokens we know he succeeded in inducing them all to participate.

Nothing is mentioned in any of the documents regarding the adoption of the design or to whom such design may be attributed. But in any case it is very chaste and the most truly Canadian of any other coin that has appeared. It can in fact be called the Canadian national coin. The arms of Montreal were designed by Jacques Viger, elected first Mayor, when the city received its charter in 1832. They are almost alone among civic arms in Canada, in following true heraldic rules. This may be attributed to the fact that Viger was an antiquarian of no mean order; and also a man of artistic taste. May we not conclude that the typical French Canadian farmer (the habitant) of the observe is also the suggestion of Viger.[1] It must at least have been the drawing of a man in sympathy with the French Canadian people and at the same time of artistic talent. Every detail in that costume, once so familiar in the streets of Montreal, was delineated and the engraver followed the design so faithfully as to leave nothing to be desired. There is the *tuque bleue*, the frock over-coat of homespun, *étoffe* with *capuchon*, the sash, *ceinture fléchée*, and the beef mocassins, *souliers de bœuf*. And in his hand the everlasting whip. Furniss sent the order to Scholefield & Son of Liverpool, who as factors or manufacturers' agents, with their head office in Birmingham, passed it on to Boulton & Watt, of the Soho Mint in that city, the real coiners.[2] This firm which did work equal in finish to any of the national coinage, often undertook large contracts for the Government in that line, when the Royal mint was unable to cope with the demand. In this manner the extensive coinage of the well known copper penny and two-penny pieces of 1797 were struck by them as were also a number of foreign coinages about that time. Messrs. Boulton & Watt's connection with the Royal mint led to the recognition of the bank tokens as lawful "coin of the realm" in Canada, by not only the Provincial but by the Imperial Government. They suggested to Scholefield & Son that, as it was contrary to law to coin copper money without authority,

ber of Montreal enterprises, and it was he who established the first gas works in the city.

[1] Since writing the above I have come across a bank bill issued in August, 1836, by the Banque Canadienne, which was carried on in St. Hyacinthe by the firm of Archambault, Pacaud, De Labruère & Cie. The reverse of this bill bears a figure of a *Habitant* exactly like that on the bank tokens. As this bill was engraved by Rawdon, Wright & Hatch, of New York, it is evident that the same design was adopted for both the bill and the coin, probably the latter was copied from the former.

[2] Appendix E, No. 2.

it would be well to apply for such authority. This suggestion Scholefield senior followed.[1] And after correspondence between the lords of the treasury and the secretary for the colonies the matter was referred to Lord Gosford, the Governor of Lower Canada, who after consulting with his advisers replied that as a supply of copper change was most necessary for the trade of the province, it was highly desirable that the request be granted. At the same time he suggested that as no copper coin had heretofore circulated in Canada for more than a halfpenny, it was undesirable that any larger denomination be coined.[2] But the suggestion came too late, as the pennies had already been ordered and probably the dies engraved.

In an ordinance of the Special Council, passed in 1839, which while purporting to prohibit the importing and manufacture of "spurious copper or brass coin" provided for the supply of acceptable copper coin, by permitting importation by individuals or corporations under proper restrictions on the authorization of the executive. This ordinance in this connection officially recognizes the coinage of 1837 in the clause which states that "provided always, that all coins shall have the same relation to the British penny and halfpenny with those recently imported by the Bank of Montreal.[3] This clause was inserted as an amendment, after the bill had been introduced, at the instance of the Hon. Peter McGill and Turton Penn;[4] the one the president and the other a director of the Bank of Montreal.

As the alternative order in case the other banks should not join in the coinage was for £2,500, it may be inferred that the issue of the Bank of Montreal was £2,000, and the City Bank, La Banque du Peuple and the Quebec Bank £1,000 each. The only change in the coins issued by the different banks was, that their name appeared as the motto on the ribbon. Even those issued in Quebec by the Quebec Bank bore the arms of Montreal.

In 1838 the Bank of Montreal gave Albert Furniss another order for £2,000 in tokens, half of which, that is 120,000 pieces was to be in penny pieces and the other half 240,000 in halfpenny pieces. This coinage arrived in June, 1839, and on its being opened by the bank authorities it was found to be "of such a very inferior grade that the cashier instructed the notary to protest against Mr. Furniss."[5]

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[1] Appendix E, No. 2.

[2] Appendix E, No. 6.

[3] Ordinances of Special Council of Lower Canada, Vol. IV., Montreal, 1839, chap. V.

[4] Journals of Special Council of Lower Canada, Vol. IV., Montreal, 1839, page 11.

[5] Appendix C.

This protest, which was served on the 15th of June, claims that the cashier in a letter of the 26th of November, 1838, instructed Furniss to procure the coins through Scholefield & Son, who had furnished those of 1837, and that they should "be similar in respect to weight and fineness of material," and the protest further claims that Furniss "had procured the copper coin from some other manufactury, that the said coins are . . . . of base material different in all respects in the manufacture, coinage and workmanship from those manufactured the previous year, and are in fact utterly unworthy of issue and disreputable to the manufactory," and further "that inasmuch as the said coins were ordered and manufactured . . . . for the special issue of the Bank of Montreal that none of (them) . . . . . should be issued . . . . which would prove to the discredit of the institution."[1] Three days later Albert Furniss had a stronger protest served on Cotterill, Hill & Co., of Walsall, England,[2] to whom the order had been sent. Attached to this protest was a letter of instructions to the notary in which it is stated that "the coin is to be shipped for England to-morrow.[3]

These protests clear up some dark points in the history of this coinage. Why are specimens of this issue so scarce? Were they simply patterns for a contemplated coinage? Had the bank ever anything to do with them? No Canadian numismatist had any knowledge that such a large coinage had been struck, that it had really been imported into Canada and then rejected and returned to the makers.

This coinage is unofficial, as no authorization either from the Imperial or from the Provincial Governments was asked or obtained, and then it does not even bear the name of the province, while it has the name of the bank both on obverse and reverse.

A second unsuccessful attempt was made by Cotterill, Hill & Co. to satisfy the bank, for in the fall of the year 1839, according to the minute book, which states under date 19th November; "letter received from Mr. Furniss, also more coin but of lower grade than former shipment."[4] This is the only record I have been able to discover respecting the coinage of 1839, but it is sufficient for us to gather that another shipment, of the same quantity as that of 1838, was struck from new dies and sent out expecting that the bank would accept it. The appearance of the coin does not bear out the bank's contention, that it was of "lower grade."

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[1] Appendix D, No. 1.

[2] *Ibid.* No. 2.

[3] *Ibid.* No. 3.

[4] Appendix C.

As a variety of the penny piece occurs with the ribbon inscribed "Banque du Peuple," it has been inferred by some that this bank was to have participated in the coinages of 1838 and 1839; but this is altogether unlikely, as none of the 1838 coins nor of the 1839 halfpennys are inscribed with the name of this bank. What in all probability actually did occur, was, that Furniss in seeking to impress upon the manufacturers in Walsall the necessity of producing as good a coinage as that of 1837, sent over a penny as a pattern and that, as the penny was one inscribed "Banque du Peuple" on the ribbon, a die was made like it, and that a quantity was struck off before the mistake was noticed. The fact that the letters on the ribbon of the 1839 coins are incased, proves that such a sample was sent over and instructions given respecting avoidance of the divergence on the coins of 1838.

The reverse of the coins of 1837 bearing the arms of Montreal was retained for the coins of 1838, but a new obverse was adopted. The French inscription and the habitant were dropped because of the rebellion of 1837, which, in Lower Canada, was attributed altogether to the French Canadians. Consequently, for a time everything savouring of that nationality, especially the costume worn by Papineau their leader was not zealously denounced. The design adopted instead was a corner view of the bank building, showing the St. Francois Xavier street side as well as the front; from this they are known as "side views" to distinguish them from the later "front views."

The only difference between the coinages of 1838 and 1839, is in the dates and the name of the bank on the ribbon, which on the former is raised, and on the latter in incused letters. This change was no doubt an attempt to follow the coins of 1837 more closely. The metal from which the tokens of 1838 were struck is more like brass, showing that it had been alloyed with a certain percentage of zinc, an alloy much used in the manufacture of saddlery hardware, the chief industry of Walsall. Those of 1839 are of much purer copper.

The side views have long been eagerly sought after by collectors, for they have always been scarce. On one occasion a fine impression sold as high as eighty dollars; but, from time to time, specimens have been unearthed in Birmingham and sent out here, so that now they seldom bring more than fifteen or twenty dollars. They are all equally rare except the halfpenny of 1839, which is more frequently met with.

After these two abortive attempts the bank held off for a while and did nothing in the line of a copper coinage for four years. In the meantime the Provinces of Upper and Lower Canada had been united, and the ordinance of 1839 above mentioned revised and extended to the whole country. The Bank of Montreal, availing itself of the clause providing for the supply of copper coin by banks or other

institutions,[1] having applied to the Governor-General-in-Council for the necessary authorization, was accorded the privilege to import such coin to the extent of £5,000, any time before the 1st of January, 1845.[2]

Under this authorization the bank imported £2,000 in pennies and halfpennies in 1842. It would appear that a heavy duty had been placed on copper coin, for on the application of the cashier a permit was granted to import this coinage free of duty.[3] In March, 1844, £2,000 worth was brought out and in June, 1845, £1,000 more which completed the £5,000 authorized in 1842. All the coins in both of these shipments which are dated 1844, are halfpennies, for no corresponding penny is known. This issue of 1844 is by far the largest of any one denomination, as it numbered 1,440,000 pieces. Consequently, it is still by far the most plentiful.

One of the documents states that in 1845 the Bank of Montreal obtained an authorization to import a further supply of copper coin to the extent of £1,200.[4] But for some unrecorded reason, although dies were prepared, no such coinage was put into circulation. Two specimens exist struck from the dies of 1845. With this last attempt the Bank of Montreal drops out of the business of catering for the supply of a Canadian copper currency and the charge devolved upon another institution.

The design for the reverse of the coinage of 1842-4, is an exact copy of that of 1837 except the date. The obverse which presents a front view of the bank building while much better in execution and finish, is not so artistic in treatment as that on the coins of 1838. In fact a front view does not afford as favourable an opportunity for the exercise of artistic taste; while the inscription "Province of Canada, Bank of Montreal" being too full also detracts from the pleasing effect. For these reasons, as well as for their rarity, the side views have always been more popular among collectors than the front views.

The similarity of treatment and workmanship, as well as the fact that one of the dies of the 1837 tokens is muled with one of those of 1842,[5] proves clearly that the latter was executed by Boulton & Watt of the Soho Mint, Birmingham.

No further effort was made to supply copper coin until 1850, when the Bank of Upper Canada took up the task relinquished by the

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[1] Provincial Statutes of Canada, 1841, Chap. VII., clauses 1 and 2.

[2] Appendix F, Nos. 6 and 7. The former is a draft by the Solicitor General, and the latter the Order-in-Council as adopted.

[3] Appendix F, No. 9.

[4] Appendix F, No. 19.

[5] Appendix A, No. 20.

Bank of Montreal. But before describing the coinage of this bank, it will be well to describe one issued by the Quebec Bank.

In January, 1851, Noah Freer, cashier of the Quebec Bank, wrote to the Hon. James Leslie, provincial secretary, asking permission to import copper coin to the amount of £2,000 sterling, on the ground that it was urgently needed for change by the merchants and traders of Quebec.[1] This request remained under consideration until the 12th of March, when it was refused because the Bank of Upper Canada had been authorized to import £5,000 worth and that this should be sufficient for the requirements of the province, and further that the coins had actually been landed in the United States.[2] On the 21st of the same month the cashier replied urging more strongly the need for small change, enclosing at the same time a petition from a number of the principal merchants of Quebec setting forth the great trouble they were experiencing "for the want of a sufficient amount of copper coin for change."[3] Those merchants, some twenty in number, contracted to take and pay for copper coin to the extent of £1,400, in amounts varying from £25 to £250. This second request was also refused for the same reasons as before, and because the Bank of Upper Canada had promised to land a portion of the coinage at Quebec. Still the cashier was encouraged by the promise that if the stringency should continue the request would be considered later on.[4] Evidently the quantity landed at Quebec was insufficient, for the cashier in November of the same year sent in a third request. This was acceeded to and the necessary authority by order-in-council, given to the Quebec Bank to import copper coin to the extent of £2,000 sterling.[5] In September, 1852, the cashier again writes advising the government that coins had been received, but that through some mistake only £2,000 currency had been imported, whereas £2,000 sterling had been authorized. The latter asked for extension of time for importing the balance, some £500, and for authority to import a further quantity amounting to £1,000.[6] This request was refused because the government intended to pass a bill favouring the adoption of the decimal system in Canada. This law, passed during the session 1852-3, was only a tentative measure which declared dollars, cents and mills to be legal forms of expressing money in Canada concurrent with pounds,

[1] Appendix F, No. 26.
[2] *Ibid.*, No. 27.
[3] *Ibid.*, Nos. 28 and 29.
[4] Appendix F, No. 30.
[5] *Ibid.*, Nos. 31 and 32.
[6] Appendix F, No. 37.

shillings and pence.[1] With its acquiescense in this refusal the Quebec Bank ceased its connection with the copper currency of the province.

In the issue of this bank there was a return to the original habitant model of 1837. In fact the two obverses are alike in all particulars, except that the word "Bas" is omitted. The reverse has the arms of the City of Quebec, in which Cape Diamond looms up in the distance, with a female and heraldic emblems in the foreground.

In a small volume of testimonials and autotype plates, giving specimens of their work, issued about 1878 by Ralph Heaton & Sons, the Mint, Birmingham, the penny and halfpenny of the Quebec Bank are illustrated;[2] which shows that these tokens were manufactured by this firm. They had lately come to the front as contractors for coinages, both British and foreign, for during the interval between the last issue of the Bank of Montreal and the first of the Bank of Upper Canada, Boulton & Watt had retired from business and the Soho Mint had been dismantled.

In February, 1850, the Bank of Upper Canada which had secured the larger part of the government deposit, was granted a "license" under the authority of the act of 1841, to import copper coin to the value of £5,000 sterling.[3] Again in November, 1851, a license for a similar amount was granted; which issue is dated 1852. But, according to a letter of the cashier the greater part of these coins did not reach Canada until 1853. This delay as he claimed, was caused by "the great pressure on the mint for the gold and silver coinages of the kingdom." He further states that the agents of the bank had applied to the "Lords of the Treasury for leave to withdraw the dies and metal from the mint" and have the balance of the coinage completed elsewhere.[4] In September, 1853, the bank applied for another permit to issue tokens amounting to £5,000 sterling, explaining that there was "a great want of small change throughout Upper Canada;"[5] and the coinage dated 1854 was imported accordingly. Again in 1856, an application for a further importation was granted, this to the extent for £10,000 worth of tokens.[6] This most extensive coinage, which together with the three previous ones aggregated $125,000, was more than the limited population of the Province of Canada could well take up; for not more than half of the tokens of 1857 were ever issued. The balance remained stored in the vaults of

[1] Statutes of the Province of Canada, 1852-3, Chap. 158.

[2] Ralph Heaton & Son . . . . Contract for the Coinage of . . . . Money Plate III., Nos. 5 and 6.

[3] Appendix F, No. 41.

[4] Appendix F, No. 44.

[5] *Ibid.*, No. 48.

[6] *Ibid.*, No. 52.

the bank until after its failure in 1866, when they were sold for old copper. Several tons of the penny pieces came into the possession of E. Chanteloup, brass founder, Montreal, by whom they were melted down. In the meantime an act was passed by which all transactions by and with the government should be calculated in decimal currency,[1] when the government undertook a duty which it had long shirked, a duty first rendered necessary when the Halifax currency was adopted. To meet the requirements of the new system a coinage of cents was ordered in 1858, from the Royal Mint. But this coinage, which amounted to 10,000,000 pieces, was issued altogether too soon, for the people had not yet accommodated themselves to the new way of counting. Consequently very little of it was put into circulation, except at a discount of twenty per cent, until 1870, when the old base coppers, that had gradually crept back into circulation, were demonetized and withdrawn from circulation at the expense of the government, and the bank halfpennies and pennies raised in value so as to circulate for one and two cents respectively. With the introduction of the decimal system and the assumption of the function of coinage by the government it ceased to be necessary for the banks to import copper tokens.

The design adopted for the obverse of the Bank of Upper Canada tokens lacks any interest for Canadians, as it is simply a copy of the legend of St. George and the dragon as portrayed by Pistrucci on the first British sovereign struck at the Royal Mint in 1817, and on the crown of 1819. And the reverse, which bears the obsolete arms of the old Province of Upper Canada, is even less interesting, as it lacks any reference to Canada or any heraldic or artistic merit.

The letters of Thomas G. Ridont, cashier, of C. C. Trevelyan and of Glyn Mills & Co.[2] seem to imply that the whole of the coinage of 1850 and part of that of 1852 were struck at the Royal Mint. But the initials R. H. & Co. under the dragon on the obverse are clearly those of Ralph Heaton & Co., afterward Ralph Heaton & Son, mentioned in connection with the Quebec Bank coinage. They have for many years contracted for large coinages when "great pressure on the Royal Mint" made it necessary to have the work done outside. These coinages, many of them for Canada, bear the initial H for Heaton. The conclusion reached is, that even the first coinage for the Bank of Upper Canada was sublet to Ralph Heaton & Sons, and when the pressure at the mint became too great to attend even to accepting and supervising this order, the agents of the bank were forced to treat with the Heatons direct. This latter conclusion is borne out by the fact that the coins of 1854 are illustrated in Heaton's testimonial book.[3]

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[1] Statutes of the Province of Canada, 1857, Chap. 18.

[2] Appendix, Nos. 44 and 45.

[3] Plate III., Nos. 7 and 8.

Thus, without any adequate remuneration did the Canadian banks come to relief of the public, suffering from the instability and insecurity of their copper change, by taking up a duty recognized as devolving upon the government, a duty which it seemed unwilling or incapable of performing. And yet it was not so much the want of trust on the part of the people in the change, privately provided, that caused the distress as its over-issue. Had it been just sufficient or a little less than sufficient, buyers and sellers would have gone on tendering and accepting it without question, one token was as good as another, for use as a counter in exchanging commodities, so long as all accepted it. It made no difference to the exchangers whether it was only worth one-half or even a quarter of the value it represented. But just as soon as these counters exceeded the requirements of the country, they came to partake of the character of a commodity, in which character they were well nigh worthless, if not to all, at least to most of the people they became discredited and were refused. It was the element of profit which the merchants had introduced into their provision of a circulating medium that was the root of the evil, and the only true way for averting such evil, a way proved by over 2,000 years of experience and practice, is, that the supplying of the necessary circulating medium in copper as well as in the nobler metals should be retained by the government, and that from this duty all elements of profit should be eliminated.

The failure on the part of the Provincial Government was the more serious because, as has already been noted, the change in the currency which practically led to the withdrawal of all legal copper change from the province, left the people to the mercy of private enterprise and consequently to the exploitation of unscrupulous traders, from which they were only rescued by the disinterested intervention of the banks.

And this vast quantity of spurious copper where has it gone? How much was imported and manufactured during the forty or more years that it continued? Shall we place it at double the issue of the banks, say $300,000, and the $150,000 they provided how little of it still continues in circulation? How much of it did the banks, in accordance with their license to issue, ever redeem?

If it took 15,000,000 counters to supply less than 2,000,000 people with small change for twenty years (60,000,000 pieces have since been issued in the whole of Canada), how many more have been required in gold and silver? We get an idea how constantly these counters have to be renewed. How expensive this provision of a medium of exchange which disappears in the course of a few years. And yet when we consider the vast aggregate transactions of the country exceeding many

thousand times the current value of this medium, the facility that it gives to such transactions, and the difficulty and limited opportunity of interchange of commodities, without such medium we arrive at its inestimable worth, and that it is truly the least costly boon provided by our government.

APPENDICES.

APPENDIX A.

Descriptive List of Canadian Bank Tokens.

1. Un Sou Tokens.

1 *Obv.* BANK TOKEN, MONTREAL: A wreath composed of laurel leaves to the left and a palm branch to the right enclosing UN | SOUS.

Rev. TRADE & AGRICULTURE, LOWER CANADA; an emblematic bouquet composed of roses, rose leaves, thistles, shamrocks, maple leaves and ears of wheat. Size 28 millimetres.

Four minor varieties.

2 *Obv.* BANK OF MONTREAL TOKEN; wreath as last, enclosing UN | SOUS.

Rev. Same as last. Size 28 m.

Four varieties.

3 *Obv.* BANQUE DU PEUPLE. MONTREAL; wreath of maple leaves enclosing UN | SOU.

Rev. AGRICULTURE & COMMERCE, BAS CANADA; a bouquet similar in composition, but different in arrangement. Size 27 m. Edge milled.

Two varieties. The execution especially of the wreath is much inferior to the last two.

4 *Obv.* Same inscription as on last, but the wreath is composed of five large maple leaves, and there is a small phrygian cap to the right and a star to the left of the wreath.

Rev. AGRICULTURE & COMMERCE, BAS-CANADA; a bouquet similar in composition to No. 1, but differing still more than the last in arrangement; one large maple leaf is its most prominent feature. Size 27 m. Edge slightly milled.

The stars and phrygian cap were introduced, no doubt, by Arnault the maker, who was a Frenchman, at the suggestion of the accountant of the bank, who sympathized with the movement then being agitated for the independence of Lower Canada. From this the coin is known as "The rebellion token."

II. Habitant tokens or Papineaus.

5 *Obv.* PROVINCE DU BAS CANADA. DEUX SOUS; a man in the costume of a French Canadian farmer of the time (a *habitant*), standing facing slightly to the right with a whip in his hand.

Rev. BANK TOKEN ONE PENNY; Arms of the City of Montreal. Argent party par saltier gules. Chief a rose, dexter a thistle, sinister a shamrock and base a beaver, all proper; enclosed within a garter inscribed CONCORDIA SALUS. Motto, on a ribbon, in incused letters BANK OF MONTREAL; under the arms is the date 1837. Size 34 m.

Three varieties.

6 *Obv.* Same as last.

Rev. As last, but the motto is CITY BANK. Size 34 m.

Three varieties.

7 *Obv.* Same as No. 5.

Rev. As No. 5, but the motto is BANQUE DU PEUPLE. Size 34 m.

Two varieties.

8 *Obv.* Same as No. 5.

Rev. As No. 5, but the motto is QUEBEC BANK. Size 34 m.

Three varieties. It may be noted that while this token was issued by a Quebec bank in the city of Quebec, it bears the arms of Montreal.

9 *Obv.* Same as No. 5.

Rev. NEW BRUNSWICK. ONE PENNY TOKEN. A full rigged ship, with sails furled, to the left. Size 34 m.

This is a mule from the reverse die of the New Brunswick coinage of 1843. Only two specimens are known.

10 *Obv.* PROVINCE DU BAS CANADA, UN SOU; habitant as on No. 5.

Rev. BANK TOKEN HALFPENNY; arms on No. 5 with motto BANK OF MONTREAL. Size 28 m.

11 *Obv.* Same as last.

Rev. As last, but motto is CITY BANK. Size 28 m.

12 *Obv.* Same as No. 10.

Rev. As No. 10, but motto is BANQUE DU PEUPLE. Size 28 m.

13 *Obv.* Same as No. 10.

Rev. As No. 10, but motto is QUEBEC BANK. Size 28 m.

III. Side Views.

14 *Obv.* BANK OF MONTREAL, 1838. Corner view of the old building of the Bank of Montreal, showing the St. Francois-Xavier street side as well as the front.

Rev. Arms and inscription similar to No. 5, but without date and the motto BANK OF MONTREAL is in raised letters. Size 34 m.

Two varieties.

15 *Obv.* As last, but the date is 1839.

Rev. As last, but the motto is in incused letters. Size 34 m.

Two varieties.

16 *Obv.* As No. 14, but date is 1839.
Rev. As No. 14, but the motto is BANQUE DU PEUPLE, in incused letters. Size 34 m.

From the motto it would appear that a coinage was proposed by La Banque du Peuple in 1839, but as no corresponding halfpenny is known, this is altogether unlikely.

17 *Obv.* As No. 14.
Rev. As No. 14, but the value is HALFPENNY. Size 28 m.
Three varieties.

18 *Obv.* As No. 14, but the date is 1839.
Rev. As No. 14, but the value is HALFPENNY, and the motto BANK OF MONTREAL is in incused letters. Size 28 m.
Three varieties.

19 *Obv.* As No. 14, but the date is 1839.
Rev. Plain. Size 28 m.
Only one specimen known, in the author's cabinet.

IV. *Front Views.*

20 *Obv.* PROVINCE OF CANADA BANK OF MONTREAL. Front view of the bank building.
Rev. Arms and inscription as on No. 5, but the date is 1842. Size 34 m.

21 *Obv.* Same as last.
Rev. Same as No. 6 (City Bank). Size 34 m.

This is evidently a mule by crossing the obverse die of a front view penny of 1842, with the reverse of a City Bank penny of 1837, as it has been occasionally met with in circulation, we are led to infer that during the coinage of 1842 a die belonging to that of 1837 had accidentally been employed. This proves that the two coinages were executed by the same firm.

22 *Obv.* As No. 20.
Rev. As No. 5, but the date is 1842, and the value HALFPENNY. Size 28 m.
Two varieties.

23 *Obv.* As No. 20.
Rev. As the last, but the date is 1844. Size 28 m.
Four varieties.

24 *Obv.* As No. 20.
Rev. As No. 22, but the date is 1845. Size 28 m.

The only specimen I have seen is in the cabinet of Thos. Wilson, Clarence, Ont. Another specimen was sold at auction in London, England, in July, 1903.

25 *Obv.* As No. 20.
Rev. VICTORIA DIE GRATIA REGINA, 1843; head of Queen Victoria to the left. Size 28 m.

A mule with the obverse die of the New Brunswick coinage of 1843, only one specimen known, in the cabinet of the Library of Parliament, Ottawa.

V. Quebec Bank Tokens.

26 *Obv.* PROVINCE DU CANADA DEUX SOUS; a *habitant* as in No. 5.
Rev. QUEBEC BANK TOKEN; *in exergue* 1852 ONE PENNY; the arms of the City of Quebec. In the foreground is a female, to the right, seated, holding a cornucopia; by her side is a shield, gules, a lion passant, gardant proper; before her is a beaver and behind a bee-hive. In the distance is Cape Diamond, surmounted by the Citadel and a ship at anchor in the river in front. Size 34 m.

27 *Obv.* As last, but the value is UN SOU.
Rev. As last, but the value is HALFPENNY. Size 28 m.

VI. Bank of Upper Canada Tokens.

28 *Obv.* BANK OF UPPER CANADA, 1850. St. George on horseback to the right, slaying the dragon; under the dragon are initials *R. H. & Co.*
Rev. BANK TOKEN. ONE PENNY. The seal of the old province of Upper Canada, which consists of a sword and anchor crossed, with a tomahawk down the centre; above is a crown, below two cornucopiæ, and in the upper right corner a part of a Union Jack. Size 34 m.

The St. George and the dragon figured on this coin is a copy of Pistrucci's design, which appeared on the first British sovereign struck in 1817. Neither it nor the obsolete seal of the old province of Upper Canada have any emblematic reference to Canada. The coinage of this bank, although the largest, is the least national of any. The initials R. H. & Co. stand for Ralph Heaton & Co., of Birmingham.

29 *Obv.* As last, but dated 1852.
Rev. Same as last. Size 34 m.

30 *Obv.* As No. 28, but dated 1854.
Rev. Same as No. 28. Size 34 m.
Two varieties.

31 *Obv.* As No. 28, but dated 1857.
Rev. Same as No. 28. Size 34 m.

32 *Obv.* As No.28.
Rev. As No. 28, but the value is ONE HALF-PENNY. Size 28 m.

33 *Obv.* As No. 28, but the date is 1852.
Rev. Same as last. Size 28 m.

34 *Obv.* As No. 28, but the date is 1854.
Rev. Same as No. 32. Size 28 m.
Two varieties.

35 *Obv.* As No. 28, but the date is 1857.
Rev. Same as No. 32. Size 28 m.

APPENDIX B.

STATEMENT OF THE NUMBER AND NOMINAL VALUE OF COPPER TOKENS IMPORTED INTO CANADA BY THE BANKS.

DATE.	BANK.	DENOMINATION.	PLACE OF COINAGE.	MAKERS.	QUANTITY ORDERED BUT NOT ISSUED.	NUMBER OF PIECES ISSUED	NOMINAL VALUE.
	Bank Token (B. of M.)	Un Sous	Birmingham			72,000 *	$ 600
	Bank of Montreal.	do	do			72,000 *	600
	Banque du Peuple.	Un Sou	Belleville, N.J.			84,000 *	700
	do	do	Montreal	J. Arnault.		12,000 *	100
1837	Bank of Montreal.	Penny	Birmingham	Boulton & Watt.		600,000	10,000
1837	do	Halfpenny	do	do		1,200,000	10,000
1838	Bank of Montreal.	Penny	Walsall	Cotterell, Hill & Co.	120,000 †		
1838	do	Halfpenny	do	do	240,000 †		
1839	do	Penny	do	do	120,000 †		
1839	do	Halfpenny	do	do	240,000 †		
1842	Bank of Montreal.	Penny	Birmingham	Boulton & Watt.		240,000 ‡	4,000
1842	do	Halfpenny	do	do		480,000 ‡	4,000
1844	do	do	do	do		1,440,000	12,000
1852	Quebec Bank.	Penny	Birmingham	Ralph Heaton & Co.		240,000	4,000
1852	do	Halfpenny	do	do		480,000	4,000
1850	Bank of Upper Canada.	Penny	Birmingham	Ralph Heaton & Co.		750,000 ‡	12,500
1850	do	Halfpenny	do	do		1,500,000 ‡	12,500
1852	do	Penny	do	do		750,000 ‡	12,500
1852	do	Halfpenny	do	do		1,500,000 ‡	12,500
1854	do	Penny	do	do		750,000 ‡	12,500
1854	do	Halfpenny	do	do		1,500,000 ‡	12,500
1857	do	Penny	do	do	750,000⊙	750,000 ‡	12,500
1857	do	Halfpenny	do	do	1,500,000⊙	1,500,000 ‡	12,500
					2,970,000	13,920,000	$150,000

* Estimated. † Returned to the makers because of inferior quality and workmanship. ‡ Estimated that the issue, pennies and halfpennies, were equally divided as to nominal value. ⊙ Half the quantity imported in 1857 was melted down.

APPENDIX C.

DOCUMENTS RELATING TO THE COPPER COINS ISSUED BY THE CANADIAN BANKS.

Extracts from Minutes of Directors of the Bank of Montreal.

Page 123, 9th June, 1837.

The subject of the Copper Coin was again discussed. The Cashier was directed to import a quantity and obtain concurrence of the other Banks.

Page 162, 10th Oct., 1837.

A letter from Albert Furniss, dated 6th inst., *re* Copper Coins ordered from England was submitted. Cashier was directed to reply that this Bank would continue the order for one-half the amount first required, even without the assent of other Banks; but upon obtaining the assent of the City and Peoples Banks, the whole £5,000 to be imported by the first spring ships.

Page 166, 3rd Nov., 1837.

Steps taken to obtain from the Government a recommendation in favour of the importation.

Page 264, 14th June, 1839.

Coin arrived from England, but was of such a very inferior grade that Cashier instructed notary to protest against Mr. Furniss for recovery of damages and interest.

Page 295, 19th Nov., 1839.

Letter received from Mr. Furniss and also more coin, but of lower grade than former shipment.

29th April, 1842.

Government authorize importation of Copper Coin by Bank of Montreal to the extent of £5,000 any time between this and the year 1845.

APPENDIX D.

No. 1.

From the Archives of the Court House, Montreal.

H. Griffin, 16629, 15th June, 1839.

On this 15th day of June in the year of our Lord 1839, we, the undersigned public notaries, duly commissioned and sworn in and for the Province of Lower Canada, residing in the City of Montreal, in the said province, at the special instance and request of the President, Directors and Company of the Bank of Montreal, did go to the Counting house of Albert Furniss, Esq., of the said City of Montreal, merchant, and there being and speaking to himself did declare unto him that, whereas the said Bank of Montreal did order from the said Albert Furniss the importation in the year 1838 from England of a large amount in money of Penny and Halfpenny pieces of the description then given, which order was executed at the manufactory in

Liverpool of Messrs. Scholefield & Son, to the entire satisfaction of the said President, Directors and Company of the Bank of Montreal, and that, whereas, in consequence, the said Bank of Montreal, by and through their Cashier, by letter bearing date the 26 day of Nov. last past, did give unto the said Albert Furniss another order for a further quantity of penny pieces and halfpenny pieces, to wit, 120,000 penny pieces and 240,000 halfpenny pieces, with such alteration in the stamp or die of the said Coin from that of the previous importation as in the said letter particularly set forth, with the express direction that the said Importation of Copper Coin should be procured from the said house of Scholefield & Son, at Liverpool aforesaid, to be similar in respect to weight and fineness of material to the coin that had been furnished by that house the previous spring, and by the same letter it was further stated that to meet the view of the said Scholefield & Son that the said Cashier would direct the agents of the said bank to pay for the said coins on delivery of the bill of lading and invoice thereof with insurance; and that whereas the said Albert Furniss did receive the said order and did promise and undertake to procure the execution thereof, but disregarding the terms of the said order did cause the whole of the said quantity of Copper Coins to be procured in England aforesaid from some manufactory other than that of the said Scholefield & Son, and which, on being shipped at Liverpool aforesaid, was paid for in good faith by the agents of the said bank in Liverpool aforesaid, and that whereas the said quantity of Coins has been received in Montreal at the banking house of this institution, and on opening the casks containing the said coins are discovered to be of base material, different in all respects in the manufacture, coinage and workmanship from those manufactured the previous season by the said Scholefield & Son, and are, in fact, utterly unworthy of issue and disreputable to the manufactory where the same was made, and we did also declare to the said Albert Furniss that in consequence of the premesis aforesaid the said Bank of Montreal could not issue the said coins, that the whole thereof would be held to his future order and be at his entire risk, charge and expense, and that the said Bank of Montreal should and would hold him, the said Albert Furniss, responsible and liable for all costs, losses, changes, damages and interests, exchanges, re-exchanges, hurts and injuries suffered and to be suffered by the said Bank of Montreal, for and by reason and upon account of the said coin having been made and shipped different to and contrary to the order and express direction of the said Bank of Montreal, through their said Cashier, and which he, the said Albert Furniss, did promise and to execute and perform. And at the same time we did direct that inasmuch as the said coins were ordered and manufactured to and for the special issue of the said Bank of Montreal, that none of the said coins should be by him issued or suffered to be issued or put into circulation which would prove to the discredit of the said institution against which and for all costs, losses, charges, damages and interests, exchanges, re-exchanges, hurts and injuries suffered and accrued, and that can, shall or may be hereafter suffered and accrued to and by the said Bank of Montreal for, by reason and on account of all and every the premesis aforesaid, and for which the said Bank can, may or ought to protest, we, the said notaries, at the instance and request aforesaid do hereby formally protest against the said Albert Furniss, and against all and every other person and persons whomsoever it doth, shall

or may concern, and to the end that the said Albert Furniss or others concerned may not pretend ignorance in the premesis, we, at the same time served him with a certified copy of these presents at his Counting house aforesaid.

This done and protested at Montreal aforesaid, in the day, month and year first above written, and signed by us notaries in testimony of the premesis.

THOMAS I. PELTON, N.P. H. GRIFFIN, N.P.

No. 2.

H. Griffin, 16631, 18th June, 1839.

On this the 18 day of June, in the year of our Lord 1839, before the undersigned public notaries, duly admitted and sworn in and for the Province of Lower Canada, residing in the City of Montreal, personally appeared, Albert Furniss, Esq., of the said City of Montreal, merchant, who declared that, whereas, in the month of November, 1838, he received an order, which he did undertake to execute, from the Bank of Montreal, in Montreal, for the importation from England in the spring of the present year for and on account of the said Bank of Montreal a large quantity of copper coins, to wit, 120,000 penny pieces, and 240,000 halfpenny pieces, according to a description minutely given, and that whereas the said Albert Furniss did transmit the said order to the manufacturing house and firm of Cotterill, Hill & Co., of Walsal, in England, with the patterns, orders and directions, who shipped the quantity of Copper Coin aforesaid, for the supply of the order aforesaid, and that whereas the said coins, on the packages being opened by the said bank on receipt of them in Montreal, have proved deficient in all respects in the manufacture, coinage and workmanship from the orders and the patterns, furnished, in consequence whereof the said Bank of Montreal have rejected the said copper coin to be, in fact, utterly unworthy of issue, and to be disreputable to the manufacturers, and have caused to be executed a formal protest against the said Albert Furniss for all costs, losses, charges and damages, interest and exchange, by reason thereof at the same time protesting against the said copper coin being put into circulation.

Wherefore the said Albert Furniss did declare to protest and did request of us, the said notaries, to extend this our formal protest against the said house and firm of Cotterill, Hill & Co., the manufacturers and shippers of the said copper coin, and for all costs, charges, damages, hurts, injuries, interests, exchanges and re-exchanges already suffered or that can, shall or may hereafter be suffered by the said Albert Furniss, for and by reason of the premesis aforesaid, and for which the said Bank of Montreal are determined to hold responsible the said Albert Furniss, and otherwise for all other matters and things for which the said Albert Furniss can, may or ought to protest touching all or any of the premisis aforesaid.

This done and protested at Montreal aforesaid, on the day, month and year first above written, and figured by us notaries in testimony of premises.

THOMAS I. PELTON, N.P. H. GRIFFIN, N.P.

No. 3.

The following letter addressed to "H. Griffin, Esq.," is attached.

D. SIR,

I think (although the furnishers of the Copper Coin make no difficulty) that it is advisible to send the protest to them. The firm is Cotterill, Hill & Co., of Walsal, in England. I think it well also to have them (the coppers) condemned. Will you be so good as to do the needful, as I leave for Upper Canada this morning.

Yours, etc.,

ALBERT FURNISS.

June 18, '39.

The Coin is to be shipped for England to-morrow.

APPENDIX E.

From the Canadian Archives.

No. 1.

Series Q, Vol. 242—1, p. 212.

HIS MAJESTY'S CONSULATE,
New York, 19th May, 1837.

SIR,

I have the honour to state that a severe domestic affliction in a branch of my family residing in Lower Canada called me to Montreal and Quebec, at the time the New York Banks suspended payments in specie. Viewing in the commercial derangement, and general bankruptcy in the United States, an event well calculated to place Canada in an elevated point of view as sustaining her credit, while the United States with her overflowing Treasury and extensive commercial operations were dazzling the world and had drawn about Twenty-five Millions of British Capital to be invested in various securities, and chiefly chartered institutions in the United States, while very little has been placed in the security of the Upper Province of Canada, though most ample, these considerations led me to be much in consultation with the merchants at Montreal and Quebec, as to the course most advisable to be pursued in the present crisis.

As the Banks at Montreal had ample to redeem their outstanding notes, it was believed that if the Canadian Silver which is locked up in the Receiver-General's chest at Quebec (about 800,000 dollars) was turned out, change for the ordinary transactions would be afforded, and under that view I was induced to address a letter to Lord Gosford (a copy of which I have the honour to enclose), but upon further deliberation it was soon discovered that it would be impossible for the Canada banks to afford further facilities to the merchants if they continued to redeem their paper when the United States banks had declined doing so, nor to continue operations by discontinuing as the quantity of produce from the United States, which is generally brought to Montreal during the shipping season, exceeds £350,000, all of which heretofore was paid in silver, and though carried into the States, it was brought back by the banks, consequently, such would not now be the case, therefore, under due deliberation, it was deemed indispensable

that the banks in Canada should suspend to pay specie, and in order to afford facilities of trade a credit would be established at New York, and for produce purchased, give draft on that City or Bills on England for the amount; thus far as to the merchants all is well, not so to the community, as the want of a circulating medium has been long severely felt in His Majesty's Provinces, and from ill-judged legislation by an Act passed in 1830, great inconvenience has been the result, and now, so much so, that the subject demands immediate attention. The Act refers to Pistareens, which passed currently at a shilling, Halifax Curency, to 10d, and the half-Pistaresa, 5d, the consequence has been that all the silver of that denomination was purchased and taken to Spain, whereby a great profit was realized while His Majesty's Government did not replace the silver thus removed; the difficulty was not then felt as American half dollars and quarters were freely brought in and thereby Canada indebted to the United States for its circulating medium, the loss of change was supplied by speculators by the introduction of base coin of copper of which vast sums have been imported from Birmingham and sold to the grocers at 5s. for 3s. 4d, the ordinary rate. A gentleman conversing with me on the state of the Copper Currency put his hand into his pocket and gave without any previous selection several of them, which I have the honour to forward. The sufferings and consequences which will arise to the community at this crisis is of a most serious character, and in order to avert which, I venture to address you, sir, and respectfully to suggest the sending out a copper coin to afford facilities for the daily business.

"British-American halfpennies and pennies." These, if sent to the Commissary-General will pay the Troops and afford a large profit—allow their carriage and freight to be of the cost in Canada of 4s. and they will pass for 5s. I do not wish to see their full value, as I wish them to remain in the Province—but 20 per cent. will secure them remaining.

I have the honour to be, sir,

Your obedient servant,

J. BUCHANAN.

To SIR GEORGE GREY, BART.,

One of His Majesty's Under-Secretaries of State, etc., etc., etc.,

COLONIAL OFFICE, LONDON.

No. 2.

Series Q, Vol. 242—4, p. 987

BIRMINGHAM, 3rd August, 1837.

MY LORD,

My sons, who are Merchants in this Town, have received an order for Copper Tokens from Canada. The letter which has been sent to them is inclosed—it appears that much spurious copper money issued by various individuals, is in circulation in the Colony, the Bank of Montreal wishes to introduce a sound Copper Currency and they profess, what we believe to be really the fact, that they do *not* at all seek to make a profit by the coinage they wish to introduce into that city, the amount they have written for is about 5,000£ Currency, say 4,500£ Sterling. On application to Messrs. Boulton & Watt of this place, who are the principal Manufacturers of Copper

Money—they tell us that a *penalty* is incurred by the 57th of George 3d, Chapter 46, page 817, by any person who coins Copper Money, but that permission is usually given on the application of parties wishing to circulate it.

Not knowing whether Your Lordship is the proper person to make the enquiry of, I am sure you will excuse me if I am in error in writing to you and will, I trust, direct me to the right quarter, or will give me such information as will enable my sons either to undertake the execution of the order, or to decline it.

Apologizing for the present liberty,

I have the honour to be, My Lord,

Yr. mo. obt. servant,

JOS. SCHOLEFIELD

The RT. HONORABLE LORD GLENELG, etc., etc., etc.

No. 3.

C. Archives, Series Q, Vol. 240—2, p. 313.

TREASURY CHAMBERS,

30th August, 1837.

SIR,

I am commanded by the Lords Commissioners of Her Majesty's Treasury to request you will state to Lord Glenelg that an application has been addressed to their Lordships by Mr. Scholefield of Birmingham, for permission to execute an order received from the Bank of Montreal in Lower Canada for a coinage of Copper Tokens for circulation in that Province, and as *their Lordships find that Lord Glenelg is already in possession of the particulars of this application* they request to be favoured with his opinion as to the propriety and expediency of acceding thereto before they give any directions on the subject.

I am, sir,

Your obedient servant,

A. Y. SPEARMAN.

JAMES STEPHEN, ESQ., etc. etc., etc.

No. 4.

P. 319.

TREASURY CHAMBERS,

21 September, 1837.

SIR,

With further reference to the Letter from this Department of 30th ulto. and to your reply thereto, of 12 inst. respecting the application of Mr. Scholefield, of Birmingham, for permission to execute an order which he had received from the Bank of Montreal for a coinage of Copper Tokens to be circulated in Lower Canada; I am directed by the Lords Commissioners of Her Majesty's Treasury to request that you will state to Lord Glenelg that in the absence of any information on the subject from the Governor of Lower Canada, My Lords must defer giving their sanction for the transmission of the Copper Tokens which the Montreal Banking Company has proposed to put into circulation in that Province, and that they have caused a communication to that effect to be made to Mr. Scholefield; but My Lords

have to request that Lord Glenelg will call upon the Governor of Lower Canada for an immediate report upon the proposition of the Montreal Banking Company in order that this Board may be apprized whether any objection exists to a compliance with Mr. Scholefield's application.

I am, sir,

Your obedient servant,

A. Y. SPEARMAN.

JAS. STEPHEN, ESQ., etc., etc., etc.

No. 5.

Series Q, Vol. 242a, p. 308.

DOWNING STREET,
28 September, 1837.

The Earl of Gosford.
No. 272.

MY LORD,

I have the honour to transmit to you the copy of an application which I have received from Mr. Scholefield, of Birmingham, for permission to execute an order which he had received from the Bank of Montreal for a Coinage of Copper Tokens to be circulated in Lower Canada. The subject belonging strictly to the cognisance of the Lords of the Treasury, Mr. Scholefield was referred to that Board. Their Lordships have informed him, that in the absence of any information on the subject from you they have declined to give their sanction to the transmission of these tokens to Lower Canada, but their Lordships have requested me to call on you, for an immediate report on the proposition of the Bank of Montreal in order that their Lordships may be apprised whether any objection exists to a compliance with Mr. Scholefield's application. I have, therefore, to request that you will furnish me with the desired Report.

I have, etc.

GLENELG.

No. 6.

Series Q, Vol. 239—1, p. 109.

(No. 122.)

CASTLE OF ST. LEWIS,
Quebec, 28th November, 1837.

MY LORD,

With reference to your Dispatch of the 28th September last, No. 272, enclosing an application from Mr. Scholefield, of Birmingham, on behalf of the Montreal Bank for permission to execute an order for coining copper tokens to be circulated in this Province, and requesting information from me on the proposition of the Bank.

I have the honour to acquaint you that having laid the matter before the Executive Council they have furnished me with a report on the subject, in which I concur, setting forth the great inconvenience arising from the want of a small and sound circulating medium to replace the base copper-coin at present in use, and recommending that the tokens to be coined be

of such weight and value as to leave no remuneration to the Bank after paying the expenses of importation into the Province.

As the People of the Country are accustomed to assign to any copper coin the value of a halfpenny only, I would suggest that in order to prevent confusion, no token of greater value than a halfpenny should be coined.

Enclosed is a Copy of the Report of Council.

I have the honour to be, My Lord,

Your most obedient servant,

GOSFORD.

The RIGHT HONORABLE LORD GLENELG, etc., etc., etc.

No. 7.

Page 111.

To His Excellency The Earl of Gosford, Captain-General and Governor-in-Chief of the Province of Lower Canada, etc., etc., etc.

Report of a Committee of the whole Council Present: The Honorable Mr. Stewart, Mr. Pembertson, Mr. Panet, Mr. Debartzch and Mr. Sheppard, on a Despatch from Lord Glenelg, dated 28th Sept., 1837, on the proposition of the Bank of Montreal for a Copper Coinage for Lower Canada.—

MAY IT PLEASE YOUR EXCELLENCY,

The Committee can have no hesitation in recommending that the application of Mr. Scholefield, on behalf of the Bank of Montreal, for permission to execute an order for Copper Tokens to be circulated in Lower Canada be granted.

It is a matter of notoriety that the Copper Coin at present in circulation is almost entirely of a base and spurious description and that great inconvenience consequently arises in the common transactions of life from the want of a small circulating medium.

The Committee, however, would humbly recommend that the tokens to be coined be of such weight and value as to leave no remuneration to the Bank save the expenses of importation into this Province.

All which is respectfully submitted to Your Excellency's wisdom.

By order,

(Signed), J. STEWART,

Chairman.

COUNCIL CHAMBERS, 22nd Nov., 1837.

Certified,

GEORGE H. RYLAND.

APPENDIX F.

No. 1.

Documents from the Archives of the Secretary of State.

OFFICE OF THE PEACE,
Quebec, 8th June, 1837.

SIR,

We have the honour herewith to transmit for the purpose of being laid before His Excellency the Governor-in-Chief, two Resolutions adopted this day at a General Special Session of the peace, especially convened to take into consideration the state of the copper currency now in circulation in this City and District. And on the part of the Magistrates we respectfully request, that His Excellency will be pleased to take into his most favourable consideration the request and views of the Magistrates contained in the said Resolutions.

We have the honour to be, sir,
Your most obedient humble servants,
(Signed), PERRAULT & SCOTT.
Clerk of the Peace.

THE CIVIL SECRETARY.

Endorsed.

Referred to a Committee of the whole Executive Council for their opinion and report on the first resolution.

By command,
W. WALCOTT,
Civil Secretary.

Quebec, 15 June, 1837.

No. 2.

PROVINCE OF LOWER CANADA,
City of Quebec.

General Special Session of the Peace under the Road and Police Acts—convened more especially for the purpose of taking into consideration the state of the Copper Currency now in Circulation in this City and District, and to adopt any measures in relation thereto which may be deemed expedient.—

Thursday, 8th June, 1837.

Resolu.—Qu'une humble adresse soit presentée à Son Excellence le Gouvernor en Chef, exposant à Son Excellence qu'il resulte de nombreux Inconveniens du manque de Monnaie de Cuivre, et priant Son Excellence de vouloir bien adopter telles mesures qu'il jugera à propos pour importer du Royaume Uni une quantite de Monnaie de Cuivre ("*pennys*" et "*half-pennys*") legale, suffisante pour faire cesser la gène qui existe maintenant à cet egard.

Resolved.—That an humble address be presented to His Excellency the Governor-in-Chief, praying that so soon as the amount of Assessments payable on Public Buildings in this City during the Current year, shall have been duly established, settled and liquidated, His Excellency will be pleased

to direct the Receiver-General to pay the same to the Road Treasurer *in small silver Coins,* viz.: *Three-penny-halfpenny, seven-pence-halfpenny* and *one shilling and three-pence* pieces, to enable the Road Treasurer therewith to pay the Pay Lists of public Works of the Surveyor of Highways of this City.

Certified,

(Signed), PERRAULT & SCOTT.

Clerk of the Peace and of the Sessions of the Peace.

No. 3.

To His Excellency The Earl of Gosford, Captain-General and Governor-in-Chief of the Province of Lower Canada, etc., etc., etc.

Report of a Committee of the Executive Council, Present: The Honorable Mr. Smith, Mr. Stewart and Mr. Cochran, on Your Excellency's Reference to a Letter from the Clerks of the Peace with two Resolutions passed by the Magistrates respecting the Coin in circulation.

Approved,

(Signed), GOSFORD.

MAY IT PLEASE YOUR EXCELLENCY,

The Committee have taken into consideration your Excellency's Reference from the Clerks of the Peace, with two Resolutions assented to in General Special Sessions of the Peace submitting to your Excellency the expediency of adopting measures of obtaining from the United Kingdom a supply of good Copper Coin for circulation in this Province, and also of directing that the amount of Assessments on the public Buildings in Quebec for this Year, be paid when ascertained in small Silver Coin. The Committee are of opinion that for the relief of the present difficulties in money circulation, especially with respect to Copper Coin, it would be highly desirable that His Majesty's Government be solicited to cause a supply of the legal Copper Coin of the Realm consisting of pence and halfpence to the amount of £2,000 to be sent out to this Country, through the Treasury Department to be lodged with the Receiver-General and paid out in discharge of Warrants from time to time.

The Committee beg leave upon this head to refer to a Report made by a special Committee of the Legislative Council in 1833, followed up by an address to the then Governor-in-Chief for the purpose of obtaining a supply of Copper Coin. With respect to the other point submitted by the Magistrates The Committee are also of opinion that it would be desirable that the amount of the assessments on the Public Buildings for the current year should, when ascertained, be paid by the Receiver-General in such small Silver Coin of the denomination mentioned by the Magistrates, as he may have in his possession.

All of which is respectfully submitted to your Excellency's Wisdom.

By order,

(Signed), WM. SMITH,

Chairman.

COUNCIL CHAMBERS,

29th June, 1837.

No. 4.

CASTLE ST. LEWIS,
Quebec, 21st November, 1837.

SIR,

I am directed by the Governor-in-Chief, to transmit to you the accompanying Despatch with one Enclosed from the Secretary of State for the Colonies, calling for information from this Government, relative to an order from the Montreal Bank, to a House at Birmingham for a Coinage of Copper Tokens, & to request that you will be so good as to lay these Documents before a Committee of the whole Executive Council, with a request that they will favour His Excellency with such information and observations on the subject, as may enable Him to furnish the Report required by the Secretary of State.

I have the honour to be, sir,
Your most obedient servant,
WALCOTT,
Civil Secy.

THE HONORABLE THE CHAIRMAN OF THE EXECUTIVE COUNCIL.

No. 5.

Copy of a Report of a Committee of the Executive Council, dated 23d March, 1842, and approved by His Excellency the Governor-General, on the 28th of the same Month, and the proposition of the Montreal Bank to issue certain Copper Coins as Tokens.—

The Committee of Council have considered the proposition of the Montreal Bank, made with the concurrence of the other Banking Institutions, to issue as the Copper Coinage authorized by the Act 4th and 5th Victoria, Cap. 17, certain Coins or tokens, the same as those issued by the same Institution, under the authority of an order in council of the Province of Lower Canada of 18th December, 1837.

This arrangement would, no doubt, be very convenient for many reasons, but as a certain limited amount of Coin is allowed to be put in circulation under the late act, and as the redemption of the issue, is, by the act, obligatory upon the person, or body corporate, making the same, the Committee are of opinion that a new die should be struck, in which case the impression might also be made applicable to present circumstances.

That all invidious reflections may be avoided, the Committee think it would be prudent for the Bank, as it does not desire profit from the transaction, to send an account of the expenses attending the Coinage, and importation, so that the same may be furnished to Parliament if called for.

Certified
(Signed), WM. H. LEE

THE HONORABLE MR. DALY.

No. 6.

PROVINCE OF CANADA.

His Excellency, etc.—

To The President, Directors and Company of the Bank of Montreal.

GREETING—

Whereas,—The President, Directors and Company of the Bank of Montreal, have made application for permission to import into the Province, or to manufacture therein, copper coins under the authority of an act of the Legislature of the said Province passed in the session held in the fourth and fifth years of Her Majesty's reign, intituled, "An act to prevent the "fraudulent manufacture, importation, or circulation of spurious Copper and "Brass Coin."—

Now Know Ye,—That I, the said Sir Charles Bagot, having taken the said application into consideration, by virtue of the power in me vested by the said act, have given and granted, and do hereby give and grant by and with the advice and consent of Her Majesty's Executive Council for the said Province, authority and permission to the President, Directors and Company of the Bank of Montreal aforesaid to import into the said Province or to manufacture therein any amount of Copper Coin or tokens of the description of pennies and halfpennies, not exceeding in nominal value the sum of Five Thousand Pounds current money of this Province, such coin or tokens to be equal in purity, weight and quality to five-sixths at the least of the British penny or halfpenny lawfully current in the United Kingdom of Great Britain and Ireland. Provided always that the said Coin or Tokens shall be stamped with the respective nominal value thereof and with the name of the President, Directors and Company of the Bank of Montreal aforesaid, and shall be payable and redeemable on demand at the said Bank of Montreal, in conformity in all respects with the provisions of the said act. And provided also that the President, Directors and Company of the Bank of Montreal aforesaid shall with all reasonable diligence, furnish to the Governor, Lieutenant-Governor or person administering the Government of the said Province for the time being an account of the expenses incurred in and about the importation or manufacture of the said coins or tokens, in order that the same may be laid before the Legislature of the said Province. And I do hereby declare that the permission of these presents given and granted shall become void and of no effect by the violation or non-observance of any of the conditions or provisions herein contained, but in case of the due observance and fulfilment thereof shall continue and be in force until the first day of January, 1845, and no longer.

Given, etc.,

This is my draught.

KINGSTON, 8th April, 1842.

(Signed), CHAS. D. DAY,

Sol. Genl.

Endorsed.

Solicitor-General's draft of Permission to the President, Directors and Company of the Bank of Montreal to import and manufacture Copper Coin.

No. 7.

PROVINCE OF CANADA.

His Excellency the Right Honorable Sir Charles Bagot, Knight Grand Cross of the Most Honorable Order of the Bath, One of Her Majesty's Honorable Privy Council, Governor-General of British North America, and Captain-General and Governor-in-Chief in and over the Province of Canada, Nova Scotia, New Brunswick, and the Island of Prince Edward, and Vice-Admiral of the same.

(Signed) CHARLES BAGOT.

To The President, Directors and Company of the Bank of Montreal.

GREETING—

Whereas,—The President, Directors and Company of the Bank of Montreal have made application for permission to import into the said Province, or to manufacture therein Copper Coins under the authority of an act of the Legislature of the said Province passed in the session held in the fourth and fifth years of Her Majesty's Reign, entitled "An Act to prevent the fraudulent Manufacture, Importation, or Circulation of Spurious Copper, and Brass Coin." Now Know Ye, that I, the said Charles Bagot, having taken the said application into consideration, by virtue of the power in me vested, by the Said Act, have given and granted, and do hereby give, and grant, by and with the advice and with the consent of Her Majesty's Executive Council for the said Province, Authority and Permission to the President, Directors and Company of the Bank of Montreal aforesaid, to import into the Said Province, or to manufacture therein any amount of Copper Coin or Tokens of the description of Pennies and Halfpennies, not exceeding in nominal value the sum of Five thousand pounds current money of this Province. Such Coin or Tokens to be equal in purity, weight, and quantity to five-sixths at the least of the British Penny and Halfpenny lawfully current in the United Kingdom of Great Britain and Ireland.

Provided always,—That the said Coin or Tokens shall be stamped with the respective nominal value thereof, and with the name of the President, Directors and Company of the Bank of Montreal aforesaid, and shall be payable and redeemable on demand at the said Bank of Montreal, in conformity in all respects with the provisions of the said Act.

And provided also,—That the President, Directors and Company of the Bank of Montreal aforesaid shall, with all reasonable diligence, furnish to the Governor, Lieutenant-Governor, or Person administering the Government of the said Province for the time being, an account of the expenses incurred in and about the importation or manufacture of the said Coins or Tokens, in order that the same may be laid before the Legislature of the said Province.

And, I do hereby declare that the permission by these Presents given and granted, shall become void and of no effect by the violation or non-observance of any of the conditions herein contained; but in case of the due observance and fulfilment thereof, shall continue and be in force until the first day of January, One thousand Eight hundred and Forty-five, and no longer.

Given under my Hand and Seal at Arms, at Kingston, in Canada, this Sixteenth day of April, in the Year of Our Lord One thousand Eight hundred and Forty-two, and in the fifth year of Her Majesty's Reign.

By His Excellency's command,

(Signed), D. DALY,
Secretary.

(Pencil notation).—O. C. 23 March, 1842—State Book A, p. 329.

No. 8.

579. No. 710.

Benj.'n Holmes, Esq., M.P.P., Cashier Bank of Montreal.

21 April, '42.

SIR,

I have the honour herewith to enclose to you by command of His Excellency the Governor-General, a Permission under the Privy Seal of the Province of Canada, to the President, Directors and Company of the Bank of Montreal to import or manufacture Copper Coin as requested in your communication of the 12th ult., the receipt of which you will have the goodness to acknowledge.

I have, etc.

No. 9.

[Copy.]

Importation of Copper Coins Duty Free.

Report of a Committee of the Executive Council dated 12th November, 1842. Approved by His Excellency The Governor-General on the 25 November, 1842.

The Committee of Council are respectfully of opinion that the Inspector General's decision to admit the Copper Coins, Mentioned in the Collector of Customs letter of the 7 November, 1842, free of duty was Correct, and they recommend the adoption of the following Order.

It is Ordered by His Excellency the Governor-General, by and with the advice of the Executive Council, that the Copper Coins imported by the Montreal Bank under an arrangement with the Executive Government be admitted free of duty.

Certified,

(Signed), E. PARENT,
C. E. O.

TO THE INSPECTOR GENERAL, etc., etc., etc.

A copy transmitted to the Collector of Customs, Montreal, on 26 Nov., 1842.

J. C.

No. 10.

BANK OF MONTREAL,
Montreal, 25 January, 1844.

SIR,

I have the honour to inform you that under the authority of the order-in-Council transmitted in your letter dated Kingston, 21 April, 1842, of which order I beg leave to enclose a Copy, there was imported by the Bank of Montreal a portion only of the Copper Coin therein sanctioned.

That now it is desirable for the convenience of the public and to supply the demand for such coin, especially in the Western section of the province that the residue of the amount then authorized should be imported by the first spring Ships.

Having made application to the collector of this port, William Hall, Esq., to know whether he was authorized to admit the residue, about £2,000 next spring, free of duty, his answer was, "not without an order from the Executive, as my instructions to remit the duty last year had reference only to the amount then imported."

May I therefore request the favour of your submitting to His Excellency the Governor-General the request of the Bank, that he will be pleased to order the requisite instructions to the Collector of the Port of Montreal to enable the Bank to supply the demand, and fulfil the object contemplated by said order-in-Council, which in its last clause limited the operation to the first day of January, 1845.

I have the honour to be, sir,

Your most obedient Servant,

(Signed), BENJ. HOLMES,

Cashier.

No. 11.

Importation of Copper Coins duty free by the Montreal Bank.

By Permission from the Governor, dated 16 April, 1842, given under the authority of an Order-in-Council of the 28 March preceding, the Bank of Montreal was authorized to import Copper Coins to the Amount of £5,000. The period within which such importation was to be made is by said Permission limited to the 1 January, 1845.

The Bank intends to import the residue of the above sum, being about £2,000 and they pray to be allowed to import it duty free, as was allowed in a similar case by an Order-of-Council of the 25 November, 1842.

The said importation made under the 4 and 5 Vict., ch. 17.

No. 12.

IN COUNCIL.

21 March, 1844.

On the Letter from the Cashier of the Bank of Montreal, dated 25 February, 1844, requesting that the Collector of Montreal may be instructed to admit free of duty the residue of the Copper Coinage authorized to be issued by the said Bank, under an Order-in-Council of the 28 March, 1842, and subsequent permission from the Governor-General of the 16 April ensuing.

Ordered, That the Collector of Customs at Montreal be authorized to admit free of duty the residue of the said Copper Coinage — about £2,000.

Certified,

E. PARENT.

To the PROVINCIAL SECRETARY.

No. 12.

616 to 643.

B. Holmes, Esq., Cashier of the Bank of Montreal, etc., etc., etc., Montreal.

SIR, 29 March, 1844.

In reply to your letter of the 25 of January last, I have the honour, by command of the Governor-General to inform you that His Excellency has been pleased to direct the Collector of Customs at Montreal to admit, free of duty, the residue of the Copper Coinage authorized to be imported into the Province by the Bank of Montreal, under the Permission granted them for that purpose by the late Governor-General, Sir Chas. Bagot, on the 16 of April, 1842.

I have, etc.

W., Entd.,

W. H. JONES, A. R. ROCHE.

No. 14.

615 on 343.

W. Hall, Esq., Collector of Customs, Montreal,

29 March, 1844.

SIR,

I have the honour by command of the Governor-General to desire that you will have the goodness to admit, free of duty, the residue of the Copper Coinage, (in amount, about £2,000), authorized to be imported into the Province by the President, Directors and Company of the Bank of Montreal, under the Order-in-Council of the 28 of March, 1842, and the subsequent Permission from the late Governor-General, Sir Chas. Bagot, of the 16 of April ensuing.

I have, etc.

W., Entd.,

W. H. JONES, A. R. ROCHE.

No. 15.

BANK OF MONTREAL,

SIR, Montreal, 14 June, 1845.

With reference to previous communications on the subject of supplying the Province with approved Copper Coin, which was undertaken by the Bank of Montreal, I beg leave now to state, that the residue of the contemplated supply of that Coin, has now arrived — viz.: 49 Casks, Weighing 8 Tons, 17 Cwt., 23 lbs., 8 oz, on Board the Brig "Conrad," from Liverpool, and that on application to the Custom House for permit to land the same, the Bank is informed, that a similar order to that given to the Collector last Spring is necessary.

Under these circumstances, may I request the favour of your obtaining for the Bank the requisite sanction from His Excellency the Governor-General, that the Bank may be enabled to get the Coin Landed, free of Duty as heretofore.

I have the honour to be, sir,

Your Most Obedient Servant,

(Signed), BENJ. HOLMES.

To The HON. D. DALEY, etc., etc., etc., Montreal.

No. 16.

1502 to 1781.

B. Holmes, Esq., Bank of Montreal. 24 June, 1845.

SIR,

I have the honour by command of the Governor-General to inform you that the issue of the permit to land the Copper Coin mentioned in your letter of the 14th inst. has been unavoidably delayed from its having been ascertained that the instrument authorising the importation thereof ceased to be of force on the 1st of January last, so that a new instrument of like tenor seems to be required in the case. Before this can be made out, it is necessary you should state for His Excellency's information how much of the £5,000 authorised in April, 1842, has not been imported, and what is the amount you wish to be allowed now to import in addition.

I have, etc.

No. 17.

BANK OF MONTREAL,

SIR, Montreal, 25 June, 1845.

I have the honour to acknowledge receipt of your letter of the 24 instant, addressed to M. Holmes, on the Subject of the Copper Coin imported from Great Britain for the use of this Bank, and in reply beg to State for the information of His Excellency the Governor-General that the following Amounts have been received in virtue of the Order-in-Council dated April, 1842, viz.:

1842	19 August.	Amount of Invoice..	£2,000	0	0
1844	18 April.	" "	2,060	16	0
		Total	£4,060	16	0

In addition to which there has been brought from England this Spring a further sum of £1,003 Sterling, which completes as near as possible the Amount Originally Applied for, Say, £5,000.

I further beg to inform you that the last mentioned Amount for which Authority is now required to pass the Customs, is all that the Bank has ordered, nor will it at present require any further Amount of Copper Coin.

I have the honour to be, sir,

Your obedient servant,

(Signed), WM. GUNN,

Ass. Cashier.

The HON. D. DALY, Secretary Province of Canada, Montreal.

No. 18.

1781 No. 101.

BANK OF MONTREAL,

Montreal, 14 June, 1845.

Represents that in accordance with an agreement previously entered into, They have imported per Brig "Conrad" 49 Casks containing 8 Tons, 17 Cwts., 23 lbs. and 8 oz. Copper Coin, and request permission to land the same.

Coin and Bullion are exempted from duty, but copper coin cannot be manufactured or imported into the Province without the special permission

of The Governor-General-in-Council — it being provided that "such permission shall contain a description of the Coin or tokens to which it shall extend — the quantity thereof to be imported or manufactured, and the time during which such permission shall be in force — and that such permission shall be announced in the Official Gazette." As the Copper Coin in question has been made in accordance with the provisions of the 1 and 2 Sec. 4 & 5 Vic., Cap 17, I recommend that His Excellency may be pleased to grant the Bank of Montreal, permission to land the same, 16th June, 1845.

(Signed),

of Customs.

No. 19.

PROVINCE OF CANADA.

His Excellency, etc.

To The President, Directors and Company of the Bank of Montreal.

GREETING—

Whereas,—The President, Directors and Company of the Bank of Montreal have made application for permission to import into the Province of Canada, or to manufacture therein Copper Coins under the authority of an act of the Legislature of the said Province made and passed in the Session held in the fourth and fifth years of Her Majesty's reign, intituled, "An Act to prevent the fraudulent manufacture, importation or circulation of spurious Copper or Base Coin."

Now Know Ye, that I, the said Charles Theophilus Baron Metcalfe, etc., etc., having taken the said application into Consideration, by virtue of the power in me vested, by the said act, have given and granted, and do hereby give and grant, by and with the consent of Her Majesty's Executive Council for the said Province, authority and permission to the President, Directors and Company of the Bank of Montreal aforesaid, to import into the said Province, or to manufacture therein any amount of Copper Coin or tokens of the description of pennies or half-pennies not exceeding in nominal value the sum of twelve hundred pounds current money of this Province, such coin or tokens to be equal in purity, weight and quantity to five-sixths, at the least, of the British penny and half-penny lawfully current in the United Kingdom of Great Britain and Ireland.

Provided always,—That the said Coin or tokens shall be stamped with the respective nominal value thereof, and with the name of the President, Directors and Company of the Bank of Montreal aforesaid, in conformity in all respects with the provisions of the said act. And provided also that the President, Directors and Company of the Bank of Montreal aforesaid, shall, with all reasonable diligence furnish the Governor, Lieutenant-Governor, or person administering the Government of the said Province for the time being, an account of the expenses incurred in and about the importation or manufacture of the said Coin or tokens, in order that the same may be laid before the Legislature of the said Province. And I do hereby declare that the permission by these presents given and granted shall become void and of no effect by the violation or non-observance of any of the conditions or provisions herein contained, but in case of the due observance and fulfilment

thereof, shall continue and be in force until the first day of October, one thousand eight hundred and forty-five and no longer.

Given, etc.

N.P.

Date, 4th July.

This is my draught.

Montreal, 25th June, 1845.

No. 20.

Copy of a Report of a Committee of the Executive Council, dated 30 June, 1845, approved by His Excellency in Council on the same day.

On the Application of the Bank of Montreal, that a Quantity of Copper Coin Amounting to £1,003 Stg. imported from Great Britain for the use of the Bank, and which Completes as near as possible the amount originally applied for, say , £5,000, may be admitted without duty.

The Committee recommend that the Collector of Customs at Montreal be authorized to admit free of duty, the residue of the Copper Coinage, about £1,003 Sterling.

Certified,

(Signed), E. PARENT.

To The PROVINCIAL SECRETARY.

No. 21.

1599 on 1781.

W. Hall, Esq., Collector, Montreal,

2 July, '45.

SIR,

I have the honour by command of the Governor-General, to convey to you His Excellency's instructions that you should admit free of duty the 49 casks of Copper Coin of the value of about £1,003 Sterling, imported on board the Brig "Conrad" for the Bank of Montreal.

I have, etc.

Entd.,

W. R. B. W. H. JONES.

No. 22.

Copy of a Report of a Committee of the Executive Council dated 4 July, 1845, approved by His Excellency in Council on the same day.

On reconsideration of the Order-in-Council of the 30 June last, authorising the admission free of duty of a certain amount of Copper Coinage by the Bank of Montreal.—

The Committee perceive that the permission formerly granted to the Bank of Montreal expired on the 1 January last, and that in consequence they require an extension of the said permission in order to take advantage of the Order-in-Council of the 30 June last.

Wherefore the Committee recommend to Your Excellency's approval the draft of the Instrument required to that effect, prepared by the Law Officer of the Crown, dated 28 June, 1845.

Certified,

(Signed), E. PARENT.

To The PROVINCIAL SECRETARY.

No. 23.

1874 to 1781.

B. Holmes, Esq., Cashier Bank of Montreal.

5 August, '45.

SIR,

With reference to your letter of the 14 of June last, I have received the commands of the Governor-General to transmit to you the accompanying Instrument authorising the President, Directors and Company of the Bank of Montreal to import the residue of the Copper Coin contemplated by the Bank under the provisions of the Act 4 and 5 Vict., Cap. 17, and upon which Instrument the usual fee of £3 5s. 0d. currency, is payable to this Department.

I am to take this occasion through you to call the attention of the President and Directors to the requirements of the enclosed, as also of the former instrument of the same character in reference to the Statement of the expenses incurred in the importation and manufacture of the Coin authorised by them to be imported, and to request that the same may be furnished in time for the next meeting of the Prov. Legislature.

I have, etc.

No. 24.

BANK OF MONTREAL,

9 August, 1845.

SIR,

I have to acknowledge the receipt of your letter dated 5 instant, transmitting an Instrument under the hand and seal of His Excellency the Governor-General, authorizing the Bank to import Copper Coin, upon which you state the usual fee to be £3 5s., which sum I beg leave herewith to enclose in liquidation of said claim.

For the information of His Excellency I beg to transmit herewith a statement of the several importations effected under the provisions of the Act 4 and 5 Vic., Cap. 17.

I have the honour to be, sir

Your obedient servant,

(Signed), BENJ. HOLMES,

Cashier.

The HON. D. DALY, Provincial Secretary, etc., etc.

No. 25.

On 10 June, 1837, The Bank of Montreal, with the view of obtaining for this Colony a sound copper currency, transmitted through Albert Furniss, Esquire, of this city, an order to Great Britain for the manufacturing of copper coin on the following terms:—

"It has been determined by the Board of Directors of this Institution to obtain an amount of copper coin equivalent to £5,000 Halifax currency, reckoning 120,000 pennies and 240,000 half-pennies to the £1,000, the weight and quality of the Copper, as also the size, thickness and fashion of the pieces, that is to say, the strong impression and raised edges to be similar to the British penny and half-penny issued from the Imperial mint in 1831."

BANK TOKEN
UN
SOUS
MONTREAL

1

TRADE & AGRICULTURE
LOWER CANADA

BANK OF MONTREAL
UN
SOUS
TOKEN

2

BANQUE DU PEUPLE
UN
SOU
MONTREAL

3

AGRICULTURE & COMMERCE
BAS CANADA

BANQUE DU PEUPLE
UN
SOU
MONTREAL

4

AGRICULTURE & COMMERCE
BAS CANADA

5

BANK TOKEN
CONCORDIA SALUS
1837
ONE PENNY

BANK TOKEN
CONCORDIA SALUS
1837
ONE PENNY

6

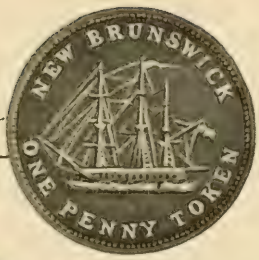
PROVINCE DU BAS CANADA
DEUX SOUS

BANK TOKEN
CONCORDIA SALUS
1837
ONE PENNY

7

BANK TOKEN
CONCORDIA SALUS
1837
ONE PENNY

8



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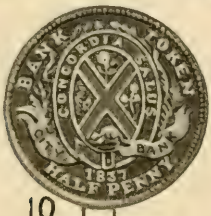

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BANK OF UPPER CANADA
1852
28
BANK OF UPPER CANADA
1850
29
BANK TOKEN
ONE PENNY
31
BANK OF UPPER CANADA
1854
30
BANK OF UPPER CANADA
1857

BANK OF UPPER CANADA
1852
32
BANK OF UPPER CANADA
1850
33
BANK TOKEN
ONE HALF PENNY
35
BANK OF UPPER CANADA
1854
34
BANK OF UPPER CANADA
1857

The Bank subsequently made further arrangements under an Order-in-Council dated 16 April, 1842, to import to the extent of £5,000, and on 19 August, 1842, they did import £2,000 Stg., the expenses incurred in the manufacturing and importation of which was as under:—

Coin	£2,000	
Engraving Dies	20	£2,020
Insurance and Shipping charges		42 18 7
Sterling		£2,062 18 7

and on 18 April, 1844, a further supply came to hand, the particulars of and charges on which were as follows:

92 Casks of Coin, weighing 16 Tons, 2 cwt. at 128 p. Ton		£2,060 16
Dock and Town Dues	£ 1 4 8	
Cartage, Porterage and Bills of Lading	9 9	
Commission 2s. 6d. p. package	11 10	
Marine Insur. on 1,500 at 25; D. on 650 at 30.. ..	28 10	
Stamps	3 6	
Commission on £2,114 15 8 at 1 per cent	21 3	75 2 8
Sterling		£2,135 18 8

In May last a final remittance was shipped, completing as nearly as possible the amount of the Order-in-Council for £5,000, on application on arrival for its admission at the Custom house it was found necessary to apply again for authority, and the Order-in-Council dated 4 July, 1845, was issued on which the following amount was landed and has since been dispersed for the accommodation of the public among the various agencies of the Bank in Western Canada—particulars as follows, viz.:—

49 Casks Copper Coin weighing 8 Tons, 10 cwt., at 118 Ton..		£1,003
Dock and Town dues	£ 10 4	
Cartage and porterage	5 0 6	
Commission, 2s. 6d. package	6 2 6	
Insurance on £1,100 at 25	13 15	
Stamp..	11	
Bank Comm. on £1,028 19 11 at 1 per cent.	10 5 10	36 5 2
Sterling		£1,039 5 2

BANK OF MONTREAL, 9 August, 1845.

No. 26.

QUEBEC BANK,
17 January, 1851.

SIR,

The Public in this City and district being subject to much inconvenience from the scarcity of Copper Coins, I am instructed by the President and Directors of this Bank to request that you will be pleased to represent this circumstance to His Excellency the Governor-General and move His Lordship to grant permission for this Bank to import from England in the course of the present year, the Sum of Two thousand pounds Sterling in pennies

and halfpennies for circulation—the said Coins to have the same relative value to the Imperial penny and halfpenny, as those imported by this Bank in 1838, in accordance with permission then granted by the Provincial Government under the provisions of the Ordinance of the Special Council 2 Vict., Cap. 5.

I have the honour to be, sir,
Your Most Obed. Serv.,
(Signed), NOAH FREER,
Cashier.

The HON. JAMES LESLIE, Provincial Secretary.

No. 27.

283 to 105, p. 117.

Noah Freer, Esq., Cashier Quebec Bank, Quebec.

12 March, 1851.

SIR,

With reference to your application, on behalf of the Quebec Bank, for permission for this Bank to import from England in the course of the present year the sum of two thousand pounds sterling in pennies and halfpennies for circulation, I have it in command from the Governor-General to state for the information for the President and Directors of the Quebec Bank, that the Bank of Upper Canada obtained permission lately to make a similar importation to the amount of five thousand pounds, which His Excellency considers equal to the wants of the circulation for some time to come. Should this view, however, not be supported by experience, His Excellency will readily, on proper representations be made, reconsider the application of the Quebec Bank.

From information received, I am enabled to add that the copper coins above referred to have actually arrived in the United States, and are daily expected here.

I have, etc.,
J. L.

No. 28.

QUEBEC BANK,
21 March, 1851.

The Hon. Ja. Leslie.

SIR,

I have had the honour to receive your letter of the 12 inst. and, having laid the same before the President and Directors of the Bank, I am instructed to acquaint you that the inconvenience experienced in this portion of the Province from the scarcity of Copper Coins, is not likely to be removed by the permission granted to the Bank of Upper Canada to import to the amount of £5,000, the whole of which it is probable will be required to meet the wants in Canada West.

Under these circumstances our Board request you will be pleased to bring the matter again to the notice of the Governor-General and solicit His Excellency to reconsider the application of the Bank. And in support of the urgency of the Case, I am desired to enclose for His Lordship's information the appeal which was made to this Institution for relief, by sundry Mer-

chants and Traders of great respectability in this City, in January last, upon which our application was founded, and I am to add that the Weekly payment for Wages to Mechanics and Labourers in this City, and in the Coves and Ship Yards of this Port, during the Summer Months, Amounts to nearly £10,000, and great difficulty is found in making change from the want of a sufficient supply of Copper Coins.

I have the honour to be, sir,
Your Most Obed. Servt.,
(Signed), NOAH FREER,
Cashier.

No. 29.

Noah Freer, Esq., Cashier Quebec Bank.

SIR,

We, the undersigned, being put to very great trouble and loss, for the want of a sufficient amount of Copper coin for change, We would be greatly obliged to the Quebec Bank if they would import, say from one to two thousand pounds worth. Should the directors comply with our request, We agree to take and pay for the sums set against our respective names as soon as the coppers arrive.

Quebec, January 10, 1851.

McDonald & Logan	Twenty-five pounds.
N. S. Henderson & Co.	Two hundred and fifty pounds.
L. & C. Tétu	Fifty pounds.
Alex. Robertson	Twenty-five pounds.
Sam. I. Shaw	One hundred pounds.
Robert Shaw	Twenty-five pounds.
E. Michon	Twenty-five pounds.
Tho. H. Oliver	Fifty pounds.
Geo. Besset	Fifty pounds.
M. G. Mountain	Twenty-five pounds.
E. & W. Poston	Fifty pounds.
W. Hossach	Twenty-five pounds.
George Hall	One hundred pounds.
Wood & Peters	One hundred pounds.
Pemberton Brothers	One hundred pounds.
Geo. W. Osborne	Fifty pounds.
R. Roberts & Co.	Fifty pounds.
D. Burnet	Fifty pounds.
Geo. Binns, Synns & Co.	Fifty pounds.
Allan, Gilmour & Co.	Two hundred pounds.
Anderson & Paradis (W. P.)	Fifty pounds.

No. 30.

373 to 105, p. 157.

Noah Freer, Esq., Cashier Quebec Bank, Quebec.

TORONTO, 28 March, '51.

SIR,

With reference to your letter of the 21 inst., urging the reconsideration of the application of the Quebec Bank for permission to import Copper coins on the ground that the whole of the importation which the Upper Canada Bank

was permitted to make would probably be required to meet the wants in Canada West, I am enabled to inform you that a considerable part of this last importation will be left for issue at Quebec and Montreal on its arrival by the first ships this spring via the St. Lawrence. The apprehension expressed in your letter is then not likely to be realized. Should it be otherwise, the Governor-General will not fail to take into consideration, any representations he may receive on the subject.

I have, etc.

Ent. A. R. R. W. H. J.

No. 31.

QUEBEC BANK,

The Hon. A. N. Morin.

17 November, 1851.

SIR,

With reference to my letters addressed to the Provincial Secretary, bearing date 17 January and 21 March last, and to the answers received from the Hon. J. Leslie of the 12 and 28 March last, I am instructed by the President and Directors of this Bank, to request that you will be pleased to bring the subject of that correspondence to the notice of His Excellency the Governor-General, and to move His Lordship to grant permission for this Bank to import from England in the course of next year, Two thousand pounds of Copper Coins, pence and halfpence for circulation, under the provisions of Act 4 and 5 Vict., Cap. 17.

I have the honour to be, sir,

Your Most Obedt. Servt.,

(Signed), NOAH FREER,

Cashier.

(Pencil Notation.)

Quebec Bank—for authority to import Copper Coins To Canada.

No. 32.

Extract from a Report of a Committee of the Honorable the Executive Council on Matters of State, dated 19 November, 1851, approved by His Excellency the Governor-General-in-Council on the same day.

On the application of The President and Directors of the Quebec Bank, dated 17 November, 1851, that permission may be granted to that Institution to import from England in the course of next year, Two Thousand Pounds in copper coins, pence, and halfpence, for circulation, under the provisions of the Act 4 and 5 Vict., ch. 17.

The Committee are respectfully of opinion that the permission authorized by the Act 4 and 5 Vict., ch. 17, be given to the Quebec Bank to import during the space of one year copper coin in pence and halfpence, to the amount not exceeding £2,000 sterling, on the condition published by the above recited Act, and that the notice required by Law be given accordingly in the Official Gazette, and that M. Secretary Morin do give the necessary instructions in the matter.

Certified,

(Signed), W. H. LEE.

To the Honorable The PROVINCIAL SECRETARY, etc., etc., etc.

No. 33.

2339 on 105, p. 563.

Noah Freer, Esq., Cashier Quebec Bank.

QUEBEC, 21 Nov., '51.

SIR,

I have received the commands of the Governor-General to inform you, in reply to your letter of the 17 instant, that His Excellency in Council is pleased to grant to the President and Directors of the Quebec Bank, the permission authorized by the Act 4 and 5 Vict., Ch. 17, to import during the space of one year Coin in pence and halfpence, to the amount not exceeding £2,000 Sterling, under the provisions of the said Act.

The Instrument granting this permission will be prepared and transmitted to you without delay, and the Notice required by the Act will be published in the Canada Gazette.

I have, etc.,

A. N. MORIN.

NOTICE.

SECRETARY'S OFFICE,

Quebec, 21 Nov., 1851.

His Excellency the Governor-General-in-Council has been pleased, to grant to the President and Directors of the Quebec Bank, permission to import for circulation, during twelve months from this date, Copper Coin in Pence and Halfpence, to an amount not exceeding Two thousand pounds Sterling, on the conditions prescribed by the Act 4 and 5 Victoria, Cap. 17.

By Command,

A. N. MORIN.

Secy.

No. 34.

2340 on 105, p. 563.

P. J. O. Chauveau, Esq., Sol. Gen.

QUEBEC, 21 Nov., 1851.

SIR,

The Governor-General-in-Council, having been pleased to grant to the President and Directors of the Quebec Bank, permission to import for circulation, during the space of one year from this date, Coin in pence and halfpence, to the amount not exceeding £2,000 Sterling, I am to request that you will be good enough, in the absence of the Attorney-General to furnish me with a draft of the Instrument required under the provisions of the Act 4 and 5 Vict., Ch. 17, for carrying His Excellency's directions into effect.

I have, etc.,

A. N. MORIN.

No. 35.

PROVINCE OF CANADA.

His Excellency, etc.—

To the President and Directors of the Quebec Bank.

GREETING—

Whereas,—The President and Directors of the Quebec Bank have made application for permission to import into the Province of Canada Copper Coin under the authority of an Act of the Legislature of the said Province passed

in the session thereof held in the fourth and fifth years of Her Majesty's Reign, chaptered seventeen and intituled "An Act to prevent the fraudulent manufacture, importation or circulation of spurious copper or brass coin."

Now Know Ye,—That I, the said James, Earl of Elgin and Kincardine, being Governor-General of Canada, having taken the said application into consideration, by virtue of the power and authority in me vested by the said Act, have given and granted and by these presents do give and grant by and with the advice and consent of Her Majesty's Executive Council for the said Province, authority and permission to the President and Directors of the Quebec Bank aforesaid to import into the said Province any amount of copper coin or tokens of the description of pennies and halfpennies not exceeding in nominal value the sum of two thousand pounds Sterling, such coins or tokens to be equal in purity, weight and quality to five-sixths at the least of the British penny or halfpenny lawfully current in the United Kingdom of Great Britain and Ireland.

Provided always,—That the said Coins or Tokens be stamped with the respective nominal value thereof and with the name of "The Quebec Bank" aforesaid, in conformity in all respects to the provisions of the said Act, and that the said President and Directors shall with all reasonable diligence furnish to the Governor of the said Province for the time being an account of the expenses incurred in and about the importation of the said Coin or Tokens, in order that the same may be laid before the Legislature of the said Province. And I do hereby declare that this permission shall remain in force until the expiration of twelve calendar months from the date of these presents and no longer.

Given, etc.

This is my draught. (Signed), P. J. O. CHAUVEAU,
Quebec, Nov. 21, 1851. Solicitor General.

No. 36.

2376 on 105, p. 581.

Noah Freer, Esq., Cashier Quebec Bank.

SIR, QUEBEC, 28 NOV., 1851.

Adverting to M. Secretary Morin's letter of the 21 instant, I have the honour to enclose the accompanying Warrant of His Excellency the Governor-General, authorizing the Quebec Bank to import Copper Coin to the amount therein mentioned, upon which a fee of Two pounds is payable to this Department.

I have, etc.,

E. P.

No. 37.

QUEBEC BANK,
22 Sept., 1852.

(Pencil notation.) For extension of time for importation of copper coins—
To C.

The Honorable A. N. Morin, Provincial Sec., etc., etc., etc.

SIR,

I have the honour to enclose for the information of His Excellency the Governor-General, an Account of the expenses incurred, in Manufacturing, and importing into Quebec, Copper Coins to the value of Two Thousand

Pounds Currency, as required by the Warrant granted by His Excellency, the Governor-General, dated 21 November last.

I have also the honour to state, that in consequence of some Misunderstanding, the amount imported has been only £2,000 Currency, instead of £2,000 Sterling, as authorised — and I have to beg on the part of this Bank, that His Excellency will be pleased to grant an extension of the period allowed by the Warrant, so as to enable this Bank to import the balance next season, together with an amount not exceeding One Thousand Pounds Sterling, in addition thereto, similar to those already imported — of which I send a Specimen herewith.

I have the honour to be, sir,
Your Most Obedient Ser.,
(Signed), C. GETHINGS,
Cashier.

No. 38.

Statement of the expenses incurred by the Quebec Bank, in causing to be manufactured, and imported into Quebec from England, 52 Casks Copper Coins, containing 240,000 Penny Pieces, and 480,000 Halfpenny Pieces, equal to £2,000 Currency, under the authority of a Warrant dated 21 November, 1851, granted by His Excellency the Governor-General.

	£	s.	d.
Paid Carriage in England..	11	16	1
Shipping, Port charges and Bills of lading	10	5	6
Commission, 5 per cent.	59	9	9
Insurance	28	12	
Duty and Commission	7	13	
Cost of dies	26	5	
Freight, Labour and Cartage	13	17	3
10½ per Cent. Prem. on £1,311 4 3 Stg. remitted.. ..	137	12	6
Expenses	295	11	1
Cost of Copper, Manufacturing, etc.	1,167	12	11
Total Cost Sterling	1,463	4	
Permitted to import p. Warant, £2,000 Stg.,—Cy.. ..	2,444	8	10
Imported	2,000		
Short Imported—Cy..	444	8	10

(Signed), C. GETHINGS,
Cashier.

Quebec Bank, 21 Sept., 1852.

No. 39.

Extract from a Report of a Committee of the Honorable the Executive Council on Matters of State, dated 1 October, 1852, approved by His Excellency the Governor-General-in-Council, on the 2 October, 1852.

On the application of C. Gethings, Esquire, Cashier of the Quebec Bank, enclosing an account of the expenses incurred in manufacturing and importing into Quebec, Copper Coins to the value of £2,000, as authorized in Council 19 November, 1851, and stating that owing to some misunderstanding, the amount imported was £2,000 currency, instead of sterling, as authorized, and requested an extension of the period allowed by such order (viz., one year), to enable that Bank to import the Balance next Season—together with an additional amount of £1,000 sterling.

Pending the question relative to the change of Currency, the Committee cannot recommend that the permission requested be granted.

Certified.

(Signed), W. H. LEE,

To the Honorable the PROVINCIAL SECRETARY, etc., etc., etc.

No. 40.

1607 to 2241 p. 668.

QUEBEC, 6 Oct., 1852.

C. Gethings, Esq., Cashier Quebec Bank, Quebec.

SIR,

The Governor-General had under consideration in Council your letter of the 22 ult., enclosing an account of the expenses incurred in manufacturing and importing into Quebec, copper coins to the value of £2,000, as authorized by M. Sec. Morin's letter to M. Freer of the 21 of November last, and stating that owing to some misunderstanding the amount imported was £2,000 currency instead of sterling as authorized, and requesting an extension of the period allowed, to enable the Bank to import the balance next season, together with an additional amount of £1,000 sterling. I am to inform you in reply that pending the question relative to the change of currency, His Excellency is not advised to grant the permission which you solicit.

I have, etc.,

E. P.

No. 41.

The Honorable A. N. Morin, Secretary of Canada, Quebec.

OFFICE OF THE BANK OF UPPER CANADA,
QUEBEC, 3 November, 1851.

SIR,

I have the honour to refer you to the letter of License granted to this Bank by His Excellency the Governor-General-in-Council, on the 23 of February, 1850, for the issue of £5,000 Stg. in Copper Tokens—as authorized by the Act 4 and 5 Vic., Cap. 17—and beg leave to inform you, that in the course of the present year the whole of that amount has been imported from the Royal Mint in London and has been put into circulation in this Province. I have further the honour to inform you, that this supply has not been found sufficient for the wants of the country, there still existing a great scarcity of Copper Coins in most parts of the Province. Under these circumstances; I am directed by the Board humbly to solicit another Letter of License to import and issue the like sum of Five thousand pounds sterling in Copper Bank Tokens—of one penny and one halfpenny each, according to the restrictions and conditions of the said Act, and that the same may be in force for one year.

It is intended, that should the above request be granted, the Bank will apply for leave to have the coinage executed at the Royal Mint in London, from the same dies as before, and I most respectfully request that the same may be recommended and allowed.

I have the honour to be, sir,
Your obedient Servant,
(Signed), THOS. G. RIDOUT,
Cashier.

No. 42..

Extract from a Report of a Committee of the Honorable the Executive Council on Matters of State, dated the 4 November, 1851, approved by His Excellency the Governor-General-in-Council on the same day.

On the Letter dated the 3 instant, of Thomas G. Ridout, Esquire, Cashier of the Bank of Upper Canada, Soliciting another Letter of License to import and issue the further sum of £5,000 Sterling in Copper Bank Tokens of one penny and one halfpenny each, according to the restrictions and conditions of the Act 4 and 5 Vic., Cap. 17, and that the same may be in force for one year.

The Committee are respectfully of opinion that the permission authorized by the Act 4 and 5 Vic., Cap. 17, be given to the Bank of Upper Canada to import during the space of one year Copper Coin in pence and halfpence to the Amount not exceeding £5,000 Sterling, on the conditions published by the above recited Act, and that the Notice required by law be given accordingly in the Official Gazette, and that M. Secretary Morin do give the necessary instructions in the Matter.

Certified,

W. H. LEE.

No. 43.

Thomas G. Ridout, Esq., Cashier of the Bank of U. P., Quebec.

SECRETARY'S OFFICE,

SIR, 6 November, 1851.

I am commanded by the Governor-General to inform you that His Excellency has had under his consideration in Council your letter soliciting for the Bank of Upper Canada, a Letter of License, similar to that granted in February, 1850, to import and issue the further sum of £5,000 Sterling in Copper Bank Tokens of one penny and one halfpenny each, according to the restrictions and conditions of the Act 4 and 5 Vic., Cap. 17, and requesting that the said letter may be in force for one year.

His Excellency in Council has been pleased to accede to the request of the Bank.

The Letter of License is accordingly in course of preparation and will be transmitted to you on receipt of the fee of £2 due thereon.

SECRETARY'S OFFICE,

Mess'. Desbarats & Dbyshire. 6 November.

GENTLEMEN,

I am commanded by the Governor-General to direct you to insert the accompanying notice in the next Official Gazette.

SECRETARY'S OFFICE,

7 November, 1851.

His Excellency the Governor-General-in-Council has been pleased to authorize the Bank of Upper Canada to issue during twelve months from this date Copper Coin in pence and halfpence to an amount not exceeding £5,000 Stg. on the conditions presented by the Act 4 and 5 Vic., Cap. 17.

By Command,

(Signed), A. N. MORIN.

Endorsed.

Memo.—A copy of the Order-in-Council within has been furnished from the Colonial Office to the Governor-General's Secretary, with a view to the necessary despatch being written. Col. Brown says that the matter will be at once attended to.

E. A. MEREDITH.

November 16, '51.

No. 44.

BANK OF UPPER CANADA,
TORONTO, 31 March, 1853.

SIR,

In consequence of various delays made at the Royal Mint in London in the coinage of the £5,000 of Copper Tokens authorized to be imported by this Bank under authority of His Excellency the Governor-General's License of the 4 November, 1851, we have only up to the present time received £1,500 of that amount, the reason alleged being the great pressure on the mint for the gold and silver coinage of the Kingdom, until at length the Master of the Mint informed our agents, Mess. Glyn & Co., that he was unable to execute the order. Under these circumstances the Bank directed other parties to be employed to complete the coinage—and Mess. Glyn & Co. having applied to the Lords of the Treasury for leave to withdraw the Dies and metal from the mint received in reply a letter from Sir C. C. Trevelyan, dated 9 inst., a copy of which is herein enclosed—granting such leave, but at the same time intimating that as the License of the Governor-General of Canada expired on the 4 November, 1852, the coinage cannot be proceeded in until a fresh License shall be obtained. I have, therefore, most respectfully to request that the License of the 4 of November, 1851, be extended to the 4 day of November, 1853, within which time, I hope, that the balance authorized may be coined and imported into this Province.

I have the honour to be, sir,
Your obedient Servant,
(Signed), THOS. G. RIDOUT,
Cashier.

No. 45.

Copy of a Letter from Sir C. C. Trevelyan, relative to License for Copper Coinage.

TREASURY CHAMBERS,
9 March, 1853.

GENTLEMEN,

I am commanded by the Lords Commissioners of Her Majesty's Treasury to acquaint you in reply to your letter of the 25 ult., that their Lordships see no objection to the token coins required for the Bank of Upper Canada, which, from the existing pressure upon the Royal Mint cannot be struck in that Establishment, being executed by other parties, and that my Lords will be prepared to authorize the Master of the Mint to deliver to you, or your agents, the several Dies bearing the impress of the Canadian tokens on condition of their restoration to the Mint when the coinage is completed, so as to secure the parties to whom they may be intrusted from the penalties, for having in possession Dies for coining without lawful authority under the Act 2 William 4, Cap. 34, Sec. 10.

My Lords observe, however, that the license granted by the Governor-General of Canada for the importation of this Coin into Canada, expired on the 4 November last, and it appears to their Lordships to be necessary that a fresh license should be obtained before they sanction any measure for the coinage.

I am, etc., etc.,

(Signed), C. C. TREVELYAN.

Extract of a letter from Mess. Glyn, Mills & Co. with reference to the above letter.

LONDON, 11 March, 1852.

"We enclose the copy of a letter we have received from the Treasury relative to the Token coinage. By this you will observe that an unexpected obstacle has been thrown in the way of our Agents, viz., the lapse by time of the license of the Governor-General of Canada for the importation of the Coin into Canada. We have addressed the Treasury in reply requesting that the Coinage may in the meantime be proceeded with and guarantying that the License shall be forthcoming in time for the exportation. This you will be pleased to obtain and forward to us, when we trust that every difficulty will be met and all further delay obviated.

"We much regret that so may delays have been occasioned by the authorities of the Mint. No exertion shall be wanting on our part to urge the matter forward, and we have no doubt of the speedy completion of the matter."

(Signed), GLYN, MILLS & CO.

No. 46.

Extract from a Report of a Committee of the Honorable the Executive Council on Matters of State, dated 9 April, 1853, approved by His Excellency the Governor-General-in-Council on the 19 April, 1853.

On the letter, dated 31 ultimo, from T. G. Ridout, Esquire, representing that under the license granted by Order-in-Council of 4 November, 1851, for the importation of Copper Coin for the Bank of Upper Canada, to the extent of £5,000, which license expired on the 3 November last, a sum of £1,500 only has been imported, owing to unexpected delays and extraordinary pressure at the Royal Mint, the Master of which has since declared his inability to complete the same—that the Treasury have consented to restore the Dies with the view of having the remainder of the said sum struck off by other parties, on condition of a renewal of the said license being obtained from the Provincial Government, for which renewal the Bank now prays.

The Committee recommend that the license be extended to one year from the present date.

Certified.

W. H. LEE,

Ast. G. C.

To the Honourable The PROVINCIAL SECRETARY, etc., etc., etc.

No. 47.

Thomas G. Ridout, Esq., Cashier Bank of U. Canada, Toronto.

SECRETARY'S OFFICE,
21 April, 1853.

SIR,

I am directed by the Governor-General to inform you that His Excellency has had under his consideration in Council your letter of the 31st ult., with its enclosures requesting that, under the circumstances therein mentioned, the License granted by His Excellency in Council to the Bank of Upper Canada for the importation into this Province of copper coin to the amount of £5,000, which License expired on the 4 November last, may be renewed and extended to the 4 November next, and to state with reference thereto that His Excellency has been pleased to comply with the said request.

The License has been handed in compliance with your request to the agent of the Bank at this place.

I have, etc.,
(Signed), A. N. MORIN.

No. 48.

BANK OF UPPER CANADA,
TORONTO, 30 September, 1853.

SIR,

The Five thousand pounds Sterling in penny and halfpenny Copper Tokens, imported from England by this Bank, under authority of the License issued by the Government of this Province in the year 1851, having been placed in circulation, and there still being a great want of small change of that description throughout Upper Canada, I have the honour to apply, on behalf of this Bank, for another License for leave to import from England a further supply of the like Copper Tokens, to the amount of Five thousand pounds Sterling, and have to request that the same be in force for one year from its date.

I have the honour to be, sir,
Your obedient Servant,
(Signed), THOS. G. RIDOUT,
Cashier.

The HON. PIERRE J. O. CHAUVEAU, Secretary of the Province of Quebec.

No. 49.

Extract from a Report of a Committee of the Honourable the Executive Council on Matters of State, dated 7th October, 1853, approved by His Excellency the Administrator of the Government in Council on the same day.

On the Letter of Thomas G. Ridout, Esquire, Cashier of the Bank of Upper Canada, dated 30 ultimo, stating that the Five thousand pounds sterling, in penny and halfpenny Copper Tokens, imported from England by that Bank, under authority of the License issued by the Government of this Province in the year 1851, having been placed in circulation, and there still being a great want of small change of that description throughout Upper

Canada, he requests on behalf of that Bank for another License for leave to import from England a further supply of the like Copper Tokens, to the amount of Five Thousand pounds sterling, and that the same may be in force for one year from its date.

The Committee humbly recommend that the License be granted on the same terms as formerly.

Certified,

W. H. LEE,
Actg. C E C

To the Honorable The PROVINCIAL SECRETARY, etc., etc., etc.

No. 50.

Thomas G. Ridout, Esq., Cashier Bank of U. Canada, Toronto.

SECRETARY'S OFFICE,
12 October, 1853.

SIR,

I have the honour to acquaint you that the Administrator of the Government has had under His Consideration in Council your letter of the 30th ultimo, applying on behalf of the Bank of Upper Canada for another letter of License in favour of that Bank to import and issue a further sum of £5,000 Sterling in Copper Bank Tokens of one penny and one halfpenny each, under the restriction and conditions of the Act 4 and 5 Vict., 17, the said license to remain in force from one year from the date of its issue.

He has been pleased to accede to the request of the Bank and to direct that the accompanying license be prepared.

There is a fee of £2 currency payable with License, which you will be pleased to remit to this office.

I have, etc.,

P. J. O. CHAUVEAU.

QUEEN'S PRINTER,
SECRETARY'S OFFICE,
12 October, 1853.

The Queen's Printer will please to cause the following notice to be inserted in the next Canada Gazette.

SECRETARY'S OFFICE,
12 October, 1853.

His Excellency the Administrator of the Government in Council has been pleased to authorize the Bank of Upper Canada to import during twelve months from this date Copper Coin in pence and halfpence, to an amount not exceeding £5,000 stg., on the conditions presented by the Act 4 and 5 Vict., ch. 17.

By Command,

P. J. O. CHAUVEAU.

No. 51.

BANK OF UPPER CANADA,
TORONTO, 18 October, 1853.

SIR,

I have the honour to own the receipt of your letter of the 12 inst. stating that His Excellency has been pleased to accede to the request of the Bank for another Letter of License to import £5,000 Stg. in Copper Bank Tokens

from England, and beg leave to request that the said License may be delivered to Mr. Bradshaw, the Manager of this Bank at Quebec, who has been instructed to pay the fees due thereon.

I have the honour to be, sir,

Your obedient Servant,

(Signed), THOS. G. RIDOUT,

Cashier.

The Honourable PIERRE J. O. CHAUVEAU, Secretary of the Province, Quebec.

No. 52.

BANK OF UPPER CANADA,

SIR, TORONTO, 6 November, 1856.

The Letter of License issued by Government on the 12th October, 1853, permitting this Bank to import from England Copper Tokens to the amount of Five thousand pounds sterling having been acted upon to that extent, I am directed again, to apply on behalf of this Bank for another License from His Excellency the Governor-General to import from England a further supply of Copper Coins or Tokens of the same stamp and fineness of the former pence and halfpence, but under date of the year 1857, to the extent of Ten thousand pounds sterling.

The Bank is induced to make this application in consequence of the great scarcity of small copper change which has for some time past existed throughout the Province, and which, it is hoped, may be in some degree alleviated by an early importation in January or February next.

The copper from which the Bank Tokens are made has hitherto been assayed at the Royal Mint and has proved to be the same purity as the British penny pieces and $^{9}/_{6}$ths its value, and the same course will be pursued under the License now applied for.

I have the honour to be, sir,

Your obedient Servant,

(Signed), THOS. G. RIDOUT,

Cashier.

The Honourable The SECRETARY OF THE PROVINCE, Toronto.

No. 53.

Copy of a Report of a Committee of the Honourable the Executive Council, dated 8 November, 1856, approved by His Excellency the Governor-General in Council on the same day.

On the application of Thomas G. Ridout, Esquire, Cashier Bank of Upper Canada, dated 6th inst., stating that the Letter of License issued by Government on the 12th October, 1853, permitting that Bank to import from England Copper Tokens to the amount of Five thousand pounds sterling, having been acted upon to that extent, he is directed again to apply on behalf of the Bank for another License to import from England a further supply of Copper Coins or Tokens of the same stamp and fineness of the former pence and halfpence, but under date of the year 1857, to the extent of Ten thousand pounds sterling.

The Committee are respectfully of opinion that the permission authorized by the Act 4 and 5 Vict., ch. 17, be given to the Bank of Upper Canada to

import during the space of one year Copper Coin in pence and halfpence to the amount not exceeding £10,000 Sterling, on the conditions published by the above recited Act, and that the notice required by law be given accordingly in the Official Gazette, and that the Honourable the Provincial Secretary do give the necessary instructions in the matter.

Certified.

W. H. LEE.

To the Honourable The PROVINCIAL SECRETARY, etc., etc., etc.

No. 54.

Thomas G. Ridout, Esq., Cashier Bank of U. Canada, Toronto.

SECRETARY'S OFFICE,
12 November, '56.

SIR,

I have the honour to inform you that His Excellency the Governor-General has had under his consideration in Council your letter of the 5th instant, applying on behalf of the Bank of Upper Canada for a Letter of License to import from England a supply of Copper Coins or Tokens to the extent of £10,000 sterling, of the same stamp and fineness of the pence and halfpence imported under the former Letter of License of 1853, but under date of the year 1857. His Excellency has been pleased with the advice and consent of His Executive Council to grant the Bank the necessary permission for the space of one year subject to the conditions as set forth this 4 and 5 Vict., chap. 17.

The necessary Letter of License is now being prepared and will be transmitted to you on receipt of the usual fee of £2 payable thereon.

Y.,

G. A. M.

SECRETARY'S OFFICE,
12 November, '56.

Messrs. Desbarats & D., Queen's Printers.

SIRS,

I am commanded to direct you to insert in the next Official Gazette the following notice:

SECRETARY'S OFFICE,
8 November, 1856.

His Excellency the Governor-General has been pleased with the advice and consent of His Executive Council to grant permission to the Bank of Upper Canada to import during twelve months from this date Copper Coins or Tokens in pence and halfpence to an amount not exceeding £10,000 Sterling on the conditions prescribed by the Act 4 and 5 Vict., chap. 17.

By Command,

E. A. M.

Assistant Secy.

No. 55.

SECRETARY'S OFFICE,
12 November, '56.

R. T. Pennforth, Esq., Gov. Secretary.

SIR,

I have the honour to transmit to you herewith a copy of an order-in-council on the subject of importation of Copper Coins to the extent of £10,000 by the Bank of Upper Canada.

No. 56.

Copy of a report of a Committee of the Honourable the Privy Council, Approved by His Excellency the Governor-General-in-Council, on the 30th August, 1870.

On a memorandum dated 26th August instant from the Hon. the Minister of Finance reporting that great public inconvenience has been experienced for some time back owing to the state of the Copper Coinage. That while bronze cents and the Copper Coins of the United Kingdom are alone a legal tender, the principal copper currency consists of Bank Tokens of the Bank of Montreal, Bank of Upper Canada, Quebec Bank and Banque du Peuple, all of which are of good quality and all authorized by law. That these coins are only current at the rate of a halfpenny currency, while postage and other stamps are in cents. That it is essentially necessary to establish a uniform copper currency, and after much consideration he is of opinion that if the Government would instruct its Departments to receive the bank tokens at one and two cents respectively, the public would do so likewise, and by this means a great deal of inconvenience would be removed. He therefore recommends that the necessary instructions be given.

The Committee advise that instructions be given accordingly.

(Certitfied),

J. S. Coté,

Clerk P. C.

ROYAL SOCIETY OF CANADA

TRANSACTIONS

SECTION III.

MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES

PAPERS FOR 1903

I.—*On the Analysis of Cheese.*

By THOMAS MACFARLANE.

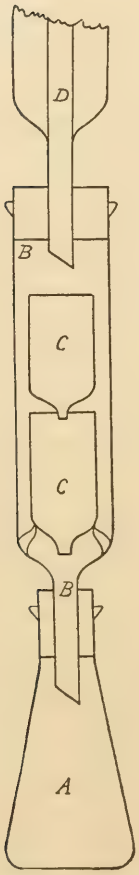
(Read May 19th, 1903.)

It is admitted by most writers on the subject that the methods in use for the examination of cheese are not at present all that could be desired. To mention only a recent authority, the authors of "The Book of the Dairy" state that in the investigation of ripe cheese "there is no method which can be regarded as suitable or trustworthy." It would serve no good purpose to endeavour to give in detail the various processes which have been suggested or practised. It will be sufficient to say that, in the analyses recorded in König's "*Nahrungs-und Genussmittel,*" the processes employed are quite diverse in character so far as regards the determination of the nitrogenous constituents, and in the most of cases, the "*Stickstoffsubstanz*" is obtained from the nitrogen percentage by multiplying it with the factor 6.25. In this manner a sufficient approximation may, perhaps, be obtained for ordinary purposes to the amount of total proteids contained in a ripe cheese, or to the percentage of casein contained in it originally. But the method cannot be regarded as scientifically accurate, and even for the practical purposes of the dairyman, it has little or no value.

The adoption of such a method neglects the fact that the original casein has undergone a complete change in the process of ripening, as well as the consideration that it is of the greatest importance that the practical cheese maker should be made aware of the nature of this alteration and of the degree to which it has extended in any sample of cheese. With the object chiefly of developing a method of cheese analysis which would be satisfactory from a practical point of view, I have thought it advisable as far as possible to follow the plan of Manette and Musso, who suggested making the following examinations:—"Determination of the "percentage of water and bodies volatile at 115° C.; preparation of a "carbon bisulphide extract; preparation of an alcoholic extract; pre-"paration of a watery extract; determination of the quantity of bodies "insoluble in bisulphide of carbon, alcohol and water; determination of "the ash; determination of ammonia; determination of the sum of the "acids present; determination of the nitrogen; and, finally, the deter-"mination of the nitrogen and ash in the different extracts, as well as "the determination of the nitrogen and ash in the residues of the dif-"ferent extracts." (Book of the Dairy, p. 274). A similar process of

investigation has also been proposed by Duclaux. (Richmond's Dairy Chemistry, p. 315).

The method employed for making these determinations was first mentioned in an article by me contained in the "Analyst," for April, 1893. It consists among other things, in the employment of a glass tube filled with crysotile fibre (so-called asbestos), into which the cheese is introduced and subjected to extraction by various solvents. The whole apparatus used for these extractions is shown in the accompanying sketch:—*A* is a flask of glass or copper in which the solvent used is boiled, either in the waterbath or over a naked flame, as the nature of the reagent requires. *B* is a Stutzer extraction apparatus for holding the substances operated upon contained in the smaller tubes above referred to. This apparatus has been named a Stutzer tube to distinguish it from the more complicated Soxhlet apparatus employed for the same purpose, and because it was first described by Dr. A. Stutzer, of Bonn in Böckmann's "*Chemisch-technische Untersuchungs Methoden,*" (1884, p. 579). The only difference in the newer apparatus is the introduction of three projections from the glass sides to support the interior extraction tubes. The latter are indicated by *C*, and it is convenient to use at least two of them, so that the determinations can be made in duplicate. These tubes are also shown in Stutzer's description, but since their more general use, they have been mentioned in some catalogues as "Macfarlane tubes," which name might as well be used for convenience of description. *D* represents an ordinary Liebig back-flow condenser.



This apparatus is operated in the following manner: — When heat is applied to the solvent in *A*, its vapour passes up between the interior or Macfarlane tubes and the sides of the Stutzer, and passes into the condenser tube, from which it returns in the liquid form, passes through the material contained in the Macfarlane tubes, and flows into the flask to be again volatilised. The extraction is thus performed at almost the boiling temperature of the solvent and is very effective. The complete submersion of the contents of the Macfarlane tubes in the solvent is secured by packing the fibre somewhat closely in the lower part of the tube. The Macfarlane tube used in the analysis of cheese has an outside diameter of 40 mm., and a greatest length of 75 mm., the depth of the

wide part being 65 mm. In filling it with the fibre it has been found advantageous to place a small piece of platinum or wire gauze over the small opening at the bottom, to prevent the fibre from being drawn down into it when the contents are being subjected to the action of the filter-pump. The fibre itself is placed in the tube in successive loose layers, so that they can be removed and replaced singly when desired.

The series of operations which it seems necessary to make for ordinary practical purposes in the analysis of cheese by the use of the apparatus just described are the following:—

I. Water and substances volatile at 98° C. After the Macfarlane tube with its crysotile contents has been dried and weighed, all the fibre except the layer at the bottom is removed, and the latter pressed down to such a degree of closeness as to prevent too rapid percolation. 5 grammes of the cheese to be examined are then mixed with part of the fibre (which had been removed and placed on a sheet of glazed paper) in a small mortar, and kneaded up intimately with it. This mixture is introduced into the tube, the mortar carefully wiped out with a little more of the weighed fibre, which is also replaced in the tube, and then the whole is covered up with the fibre still remaining on the glazed paper. The tube is then placed in a rack with others, and dried in the water-bath at 98° C. This effects a very perfect elimination of the water, owing to the fine sub-division of the particles of the cheese, and the insertion of the fibre between them. This is proved by the close agreement of duplicate determinations. On cooling and weighing the tubes, the loss in weight indicates the quantity of moisture and volatile constituents present.

II. Butterfat and added oils. By subjecting the tube and its contents to the action of petrolic ether of low boiling point in the above described apparatus for 3 or 4 hours, all the fat is removed. The heat is applied by means of a water-bath, and on this account the petrolic ether should not contain any hydrocarbons of higher boiling point than 80° C. Of course, bisulphide of carbon or chloroform may be substituted for the petrolic ether, but the latter has the advantage of cheapness. After the extraction, the tube is placed over the filter pump and deprived of most of the solvent mechanically retained in it. It is then placed in a tray with other tubes which have undergone the same treatment, and heated in the water-bath for 2 hours, allowed to cool in the desiccator and weighed. The loss gives the quantity of butter and other fats.

III. Alcohol Extract.—The tube is next subjected to extraction by alcohol of 92 or 95 p. c. by volume. The solvent is heated by direct flame, and is contained for safety's sake in a copper flask. The Stutzer

tube and condenser are used as in the preceding extraction. On freeing the tube from excess of alcohol, drying and weighing it, the amount of substance extracted by alcohol is ascertained. These substances consist of some of the products of the alteration of the casein, and seemingly of those which give to the cheese its characteristic flavour.

IV. Aqueous Extract.—This is obtained by taking the tube which has been exhausted by alcohol, and treating it in exactly the same manner with distilled water, or by allowing hot water to percolate through it. In this case a further quantity of soluble substance is removed, which is also derived from the alteration of the casein. Its amount is ascertained by weighing the dried tube and noting its loss in weight.

V. Casein.—The residue of insoluble matter remaining in the fibre after the removal of the water soluble constituents consists, without doubt, mainly of casein which has escaped alteration.

The following table I, contains a record of the results obtained in the above described series of determinations on samples of cheese purchased in the Canadian market. It will be observed that these analyses have been made in duplicate:—

TABLE I.—PROMINENT RESULTS OF CHEESE ANALYSIS.

NAME OF BRAND.	ANALYST.	I. Moisture. p. c.	II. Fat. p. c.	III. Hot Alcohol Extract. p. c.	IV. Hot water Extract. p. c.	V. Residue—Unaltered casein p. c.	VI. Ash. p. c.	VII. Caseids. p. c.	VIII. Caseones in Caseids. p. c.	IX. Alcohol soluble caseone in caseids. p. c.
Canadian, M	A. C. Macfarlane	25·10	39·00	8·48	5·72	21·70	3·50	35·90	39·50	23·62
do	do	25·20	38·76	8·50	6·64	20·90	.....	36·04	42 01	23·58
Canadian, K	do	28·14	36·16	11·06	6·94	17·70	3·45	35·70	50·70	30·98
do	do	27·94	35·76	10·90	8·10	17·30	.....	36·30	52·31	30·03
Gruyere	do	31·06	27·84	11·64	7·66	21·80	3·94	41·10	46·96	28·81
do	do	30·70	28·22	11·68	8·16	21·24	.....	41·08	48·29	28·43
Imperial Potted	A. L. Tourchot.	30·72	34·19	9·58	6·76	18·75	4·32	35·09	46·57	27·30
do	Miss E. Davidson.	32·26	30·62	10·80	4·30	22·02	5·00	37·12	40·60	29·09
McLaren's Imperial	A. L. Tourchot.	29·99	35·79	10·48	7·16	16·58	4·01	34·22	51·55	30·62
do	Miss E. Davidson	29·52	34·76	11·72	11·10	12·90	4·26	35·72	63·88	32·81
do	A. C. Macfarlane	29·06	34·62	10·72	6·60	19·00	4·10	36·32	47·59	29·51
do	do	29·20	35·90	10·20	6·90	17·80	.....	34·90	48·99	29·22
Glen	do	33,20	33·60	11·36	7·50	14·24	3·04	33·10	56·98	34·32
do	do	33·00	35·50	9·56	6.34	15·60	.....	31·50	50·48	30·35
Oka	do	43·60	26·20	9·56	7·80	12·84	3·11	30·20	57·48	31·33

TABLE I.—PROMINENT RESULTS OF CHEESE ANALYSIS.—*Continued.*

NAME OF BRAND.	ANALYST.	I. Moisture. p. c.	II. Fat. p. c.	III. Hot Alcohol Extract. p. c.	IV. Hot water Extract. p. c.	V. Residue—Unaltered casein p. c.	VI. Ash. p. c.	VII. Caseids. p. c.	VIII. Caseones in Caseids. p. c.	IX. Alcohol soluble caseone in caseids. p. c.
Oka	A. C. Macfarlane	42·90	26·20	9·70	8·20	13·00	.....	30·90	57·93	31·39
do	A. L. Tourchot	47·40	20·54	11·03	5·49	15·54	4·82	32·06	51·63	34·40
do	Miss E. Davidson	45·84	25·82	9·82	9·50	9·02	4·48	28·74	68·61	34·16
Bow Park	A. C. Macfarlane	32·40	32·36	11·46	6 62	17·16	3·57	35·24	51·31	32·52
do	do	32·30	32·16	11·74	7·54	16·26	.....	35·54	54·25	33·03
Limburg	A. L. Tourchot	42·04	26·12	12·59	7·72	11·53	3·32	31·84	63·77	39·54
do	Miss E. Davidson	38·46	32·78	10·66	10 82	7·28	3·52	28·76	74.68	37·06
Hague	A. C. Macfarlane	45·74	9·86	19·00	7·54	17·86	3·68	44·80	59·77	42·79
do	do	46·16	11·00	19·04	9 00	14·80	.....	42·84	65·45	44·44
Roquefort	do	32·70	30·10	15·66	8·24	13·30	3·65	37·20	64·24	42·09
do	do	34·70	27·98	14·24	6·48	16·60	.....	37·32	55·52	38·16
do	A. L. Tourchot	33·65	34·89	15·53	5·87	10·06	5·63	31·46	68·02	49·36
do	Miss E. Davidson	34·82	36·06	15·00	10·42	3·70	5·46	29·12	87·29	51·51
Camembert	A. C. Macfarlane	48·40	28·82	13·38	6·54	2·86	3·91	22·78	87·44	58·74
do	do	48·10	29·24	13·30	6·68	2·68	.....	22·66	88·17	58·69

In this table the columns I, II, III, IV and V, represent the percentages obtained by the operations given in the preceding description under the same numbers. Owing to the variations in the quantity of moisture present in the different samples, a comparison of these with each other is rendered somewhat difficult, especially as regards the extent to which the casein has undergone alteration. In order to bring out this point more clearly, columns VII, VIII and IX, have been added. The figure in VII consists of the sum of columns III, IV and V, and may also be obtained by deducting the percentages of moisture and fat contained in the sample from 100. It represents the casein and the products of its alteration during ripening, and also includes the ash, given separately in column VI. For the sake of convenience the name of "Caseids" is given to this group of substances, using the term in a sense somewhat analogous to that of "Proteids." Column VIII is headed "Caseones in Caseids," and indicates the percentage of the latter which is soluble in water, including the alcohol soluble, most of which is also capable of being removed by water. The name "Caseone," was applied by Duclaux to represent the products of ripening, but their quantity was ascertained by a tedious process of aqueous extraction performed on the original cheese, and by ascertaining and deducting the inorganic constituents. Duclaux's figure would therefore differ from those contained in column VIII, which not only include the ash proper of the casein, but also the salt added in the process of manufacture. As an index of the degree to which the process of ripening has extended in a cheese the figures given in column IX, appear to be better applicable. The alcohol seems to remove from the cheese less of the ash constituents and the results in duplicates show a better agreement. The determination of "alcohol soluble caseone" is therefore proposed as a practical test of the degree of ripening, and it is anticipated that it will be found to bear a distinct relation to what is known by practical men as the "breaking down" of a cheese in the process of curing it. By reference to the table it will be observed that the percentage of "alcohol soluble caseone" in the caseids varies from 23.58 in the case of a Canadian cheese to 58.74 in the case of Camembert. It will also be seen that it is quite high in the case of "Hague," which is a Canadian cheese, evidently made from skimmed milk.

In order to obtain some idea of the nature of the substances extracted by alcohol and then by water from the dried and fat free constituents of cheese, which have been called "caseids," determinations were made of the nitrogen and ash contained in the extracts from certain cheese samples, and Table 2 contains the results of this investigation. In the analyses which this table contains, the caseids are calculated from the total nitrogen of the cheese by using 6.35 as the factor for casein.

The factors heretofore used for this purpose by different analysts vary from 6.25 to 6.45, according to the percentage of nitrogen which they believed to be present in pure casein. These two figures correspond respectively to 16.0 and 15.5 per cent. The average of the factors (6.35) corresponds to a nitrogen percentage of 15.75, which is quite close to the average of the analyses of Hammarsten and Chittenden (15.78), who followed the same method of preparing pure casein.

Table II. explains itself. Interest attaches chiefly to the percentage of nitrogen contained in the organic matter of the alcoholic and aqueous extracts. In the former this varies from 3.74 to 8.21 per cent, while the aqueous extract contains a much larger proportion varying from 11.33 to 15.19 per cent. No doubt these extracts contain different bodies, and in the case of the alcohol extract more or less lactose, lactic acid or lactates may be present. At the same time it is to be remembered that they are mostly products of the alteration of casein and contain less nitrogen than that substance. It is therefore reasonable to conclude that the process of ripening is accompanied by an elimination of a certain quantity of nitrogen. Some of this in the form of ammonia is contained in the alcohol extract probably combined with lactic acid and may be liberated by heating with magnesia. But its quantity is small compared with the total nitrogen of the alcohol extract, and therefore other nitrogenous bodies must be present. To ascertain the relative quantities of these and ammonia in the alcohol extract, as well as the quantity of free lactic acid, another series of examinations was undertaken, the results of which are given in Table III. In the manipulation necessary to obtain the figures contained in Tables II and III, I obtained very substantial assistance from my son, Mr. A. C. Macfarlane. In the Table III. series the volatile acids were also determined by distillation and titration, their quantity being calculated as butyric acid and deducted from the loss on drying. In estimating the free lactic acid in the dried cheese an extraction by ethylether was allowed to precede that by alcohol, and the acidity of the extract is stated as lactic acid.

TABLE II.—Results of examining samples of foreign cheese, both by the ordinary and extracting methods, and showing nature of the alcoholic and aqueous extracts.

	OKA		GRUYERE		ROQUEFORT		CAMEMBERT	
ORDINARY METHOD.	p. c.	p. c.	p. c	p. c.	p. c.	p. c.	p. c.	p. c.
Moisture	45·10	46·00	34·76	34·10	32·70	34·70	49·40	47·80
Fat	25·96	24·36	26·00	24·96	30·10	27·98	27·40	28·70
Caseids (N × 6·35)	24·43	24·43	29·10	29·10	23·16	23·16	19·21	19·21
Total Ash	3·11	3·11	3·94	3·94	3·65	3·65	3·91	3·91
	98·60	97·90	93·80	92·10	89·61	89·49	99·92	99·62
Total Nitrogen	.....	3·847	....	4·584	.....	3·647	3·025	.....
EXTRACTION METHOD.								
Moisture	45·10	46·00	34·76	34·10	32·70	34·70	49·40	47·80
Fat	25·96	24·36	26·00	24·96	30·10	27·98	27·40	28·70
Organic matter—								
In alcoholic extract	5·72	5·84	9·54	.....	13·26	11·84	10·70	11·10
In hot water extract	4·54	4·64	4·24	.....	7·24	5·48	5·70	6·34
In residue ; by difference	15·57	16·05	21·52	.....	13·05	16·35	2·89	2·15
Ash—								
In alcohol extract	0·88	0·88	1·24	.....	2·40	2·40	1·60	1·60
In hot water extract	0·80	0·80	0·86	....	1.00	1·00	1·06	1·06
In residue ; by difference	1·43	1·43	1·84	.....	0·25	0·25	1·25	1·25
	100 00	100·00	100·00	....	100·00	100·00	100·00	100·00
Nitrogen—								
In alcohol extract	.....	0·424	0·526	.....	.....	0.440	0·879	.....
In hot water extract	.....	0·526	0·664	.....	.....	0·627	0·764	.....
Per centage of nitrogen in organic matter of—								
Alcohol extract	.....	7·26	5·52	.....	.....	3·74	8·21	.....
Hot water extract	.....	11·33	15·19	.....	.....	11·44	13·40	.....

TABLE III.—Results of examining samples of Cheese by ordinary and extraction methods, and showing nature of the Ethylether and other extracts.

	OKA		GRUYERE		ROQUEFORT		CAMEMBERT		CANADIAN M.	
ORDINARY METHOD.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p c.	p. c.
Moisture	43·60	42·90	31·06	30·70	33·70	32·42	48·40	48·10	25·10	25·20
Butter fat	26·20	26·20	27·84	28·22	34·24	34·68	28·82	29·24	39·00	38·76
Caseids (N × 6·35)	.....	24·36	.....	29·03	.....	23 09	.....	19·16	.....	26·67
Ash, total	.....	3·11	.....	3·94	.....	3·65	.....	3·91	.....	3·45
	....	96·57	.....	91·89	....	93·84	.....	100·41	.....	94·08
EXTRACTION METHOD.										
Moisture, &c.	42·78	42·06	31·06	30 70	30·83	29·56	44·97	44·59	23·11	23·17
Butyric acid	0·82	0·84	undete	rmined	2·87	2·81	3·43	3·57	1·99	2·03
Butter fat	26·20	26·20	27·84	28·22	34·24	34·68	28·82	29·24	39·00	38·76
Organic matter—										
In Ethylether extr't	0·59	0·83	0·70	0·92	1·05	1·13	1·58	1·32	0·79	0·93
Lactic acid in same.	0·17	0·17	0·14	0·14	0·07	0·07	0.20	0·20	0·01	0·01
In alcohol extract	7·92	6·99	9·56	9·66	9 90	10·57	10·00	9·89	6·25	6·13
In hot water extract	7·00	6·80	6·80	5·18	6·24	5·66	5·48	4·66	3·70	4·62
In residue (by difference)	11·41	13·00	19·96	21·24	11·15	11·82	1·61	2·68	21·70	20·90
Ash—										
In alcohol extract	0·88	1·89	1·24	0·96	2·40	1·87	1·60	1·89	1·43	1·43
In hot water extract	0·80	1·22	0·86	2·98	1·00	1·54	1·06	2·02	2·02	2·02
In residue, by difference	1·43	0·00	1·84	0·00	0·25	0·24	1·25	0·00	0·00	0·00
	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00	100·00
Nitrogen—										
In alcohol extract as combined ammonia	0·068	.....	0·049	.....	0·068	.....	0·100	.....	none	.....
As organic nitrogen	0·595	.....	0·515	.....	0·869	.....	0·840	.....	0·426	.....
In hot water extract	0·857	.....	0·869	.....	0·728	.....	0·690	.....	0·641	.....
Per centage of nitrogen in the organic substance of—										
Alcohol extract	8·49	.....	8·07	.....	9·46	.....	9·40	.....	6·81	.....
Hot water extract	12·24	.....	12·77	.....	11·66	.....	12·59	.....	17·32	.....

From Table III. it will be observed that the percentage of nitrogen in the organic substance of the alcohol extract varies from 6.81 to 9.46, showing again a much lower percentage than casein. As regards the nature of this substance it is difficult to come to a conclusion concerning it. Nearly all proteids have heretofore been regarded as insoluble in alcohol. In Wroblewski's classification of these (The Analyst XXIII, p. 107), there is certainly mention made under his Group I of a subdivision of "albuminous substances soluble in alcohol," but these are chiefly of vegetable origin, a prominent example being gliadin, one of the constituents of gluten. Casein itself is classed as a compound proteid or nucleo-albumin. The nitrogen percentage in the organic matter of the aqueous extract is higher than that of the alcohol extract, but lower than casein, and the substance would seem to be capable of classification among the peptones. Further investigation is required in order to ascertain the true composition and nature of the substances contained in these extracts.

II.—*The Rate of Decomposition of Potassium Chlorate under the Influence of Heat.*

By S. B. CHADSEY.

(Communicated by Dr. W. H. Ellis, and read May 20th, 1903.)

The experiments outlined in the following paper were carried out with the object of obtaining a knowledge of the course of the changes which potassium chlorate undergoes when subjected to the action of heat. It was recently shown by Sodeau (J. Chem. Soc., 1900, p. 138), that pure potassium chlorate when heated yields only very small quantities of chlorine, so that the changes consist almost entirely in the formation of potassium perchlorate, potassium chloride and oxygen. The rate of the decomposition of the chlorates of calcium and barium was studied by Potilitzin in 1887. (J. Russ. Chem. Soc., 1887; Ber., 1887; Ref. 769). But as I have met with no reference to similar determinations for potassium chlorate it seemed desirable to carry out a series of experiments in which quantities of chlorate could be heated at various constant temperatures and the products of the decomposition measured.

The chlorate used in the experiments was prepared from the commercial "pure" salt by repeated recrystallization, and was shown to be perfectly neutral and free from chlorides. Special precautions were taken to prevent contamination with dust, and lint from filter paper was avoided by allowing the chlorate obtained from the last recrystallization to drain on unbaked porcelain. The purified product was dried at 110°, pulverized and again heated at 110° for three hours to ensure the removal of all moisture. Subsequent absorption of small quantities of moisture was avoided by keeping the dried salt in a desiccator.

Amounts of 0·5 gm. enclosed in bulbs blown on tubes of soda glass, 20-25 cm. in length and 7 mm. in diameter, were heated in a small electric dental furnace (Dr. C. A. Timme, Berlin), of internal dimensions 8 cm. x 8 cm. x 4·3 cm. The tubes containing the chlorate were placed horizontally in the furnace through a small opening in the fire-clay door, and by this arrangement splashes of the molten chlorate were retained by the upper surface of the bulb, and were not carried into the cool parts of the tube.

The furnace was heated by means of the 110 volt public circuit, regulated roughly by a large coil rheostat, and more closely by a lamp rheostat in parallel with the latter (Fig. 1). But as the large variations in the voltage of this circuit prevented the maintenance of constant temperatures a supplementary circuit of storage cells was arranged

to include the furnace and an ammeter of the main circuit as indicated in Fig. 1. The direction of the current from these cells was opposed to that of the main circuit and by adjusting the voltage of the cells so that it was nearly or quite equal to the fall in voltage of that circuit between the points *a* and *b*, Fig. 1, *i. e.*, between the terminals of the furnace, any considerable increase in the voltage of the main circuit traversed the cells as a charging current, while any considerable decrease was corrected by

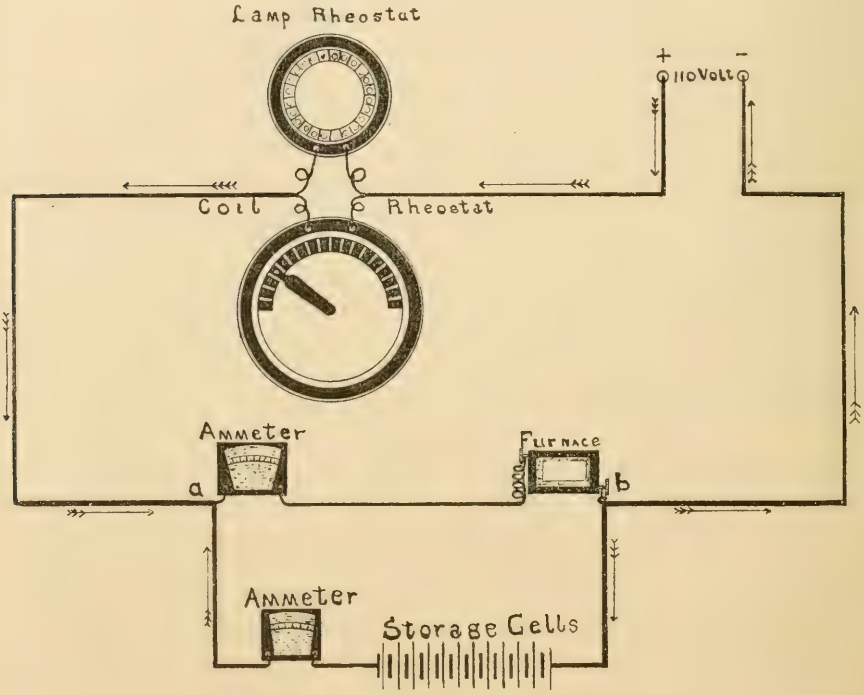


FIG. 1.

the discharge of the cells. By this means the fall of voltage between the terminals of the furnace could be kept at any desired value, and constant temperatures secured.

The temperatures were measured by means of a LeChatelier pyrometer, the rhodium platinum juncture of which was bound to the outside of the bulb containing the chlorate, by means of a thread of asbestos. The accuracy of the readings of the pyrometer were tested by means of steam, the vapor of sulphur, and the melting point of potassium chlorate, and were found to be satisfactory.

In carrying out the experiments, the bulb with thermocouple attached was quickly inserted into the furnace which had been previously heated so that the temperature at which the decomposition was to be

effected could be attained in three or four minutes. At the expiration of the time set for heating, the bulb was removed from the furnace, and allowed to cool in a desiccator. By repeatedly exhausting the desiccator the removal of all excess of oxygen from the bulb was ensured so that it could be weighed when filled with air.

In preliminary experiments the volume of the gas evolved from the chlorate was measured over mercury and its calculated weight compared with the loss of weight of the bulbs. As these corresponded as closely as the readings of the volume allowed, the oxygen set free in subsequent experiments was estimated by the loss of weight, and no attempt was made to measure the gas.

The solid residue was examined for chloride and undecomposed chlorate, as follows: A solution of the residue in 200^{cc} was made, and 25^{cc} of this titrated for chloride, with 10^{n} or 20^{n} silver nitrate—using potassium chromate as indicator. From the amount of chloride found, the weight of chlorate decomposed was calculated as well as the total weight of oxygen evolved in this decomposition.

A second 25^{cc} of the 200^{cc} solution, was examined for undecomposed chlorate by the method of N. Blattner and J. Brassner (Zeit. Angerw. Chem., 1900, p. 1185). Sulphur dioxide was passed through this portion in order to reduce the chlorate to chloride, thus:

$$KClO_3 + 3SO_2 + 3H_2O = KCl + 3H_2SO_4$$
$$= KCl + 3H_2SO_4$$

As the perchlorate is not reduced by sulphur dioxide, this operation may be safely carried out. Excess of sulphur dioxide was immediately removed by boiling and the sulphuric acid formed in the solution neutralized with C. P. calcium carbonate (Precip). After cooling, the chloride in solution was estimated by titration as before, and the excess over that of the previous estimation used to calculate the amount of undecomposed chlorate in the residue.

This method was found to work very well, although some difficulty was at first experienced with silver nitrate titrations when considerable quantities of chlorate had been reduced. The precipitate of silver chloride in these cases formed quickly into curdy masses which entangled the red precipitate of silver chromate, and thus impaired the sharpness of the end point. This was found to be due, not to the excess of calcium carbonate, which exercises no influence upon the reaction, but to the calcium sulphate formed in the neutralization. Even when the precipitated sulphate was removed by filtration the chloride was still curdled. Moreover, when a quantity of C. P. calcium sulphate was added to a solution of pure sodium chloride and the excess filtered off, the filtrate

showed the same phenomenon with silver chloride as before. It was concluded therefore that sufficient calcium sulphate goes into solution to produce this effect. Since barium sulphate is almost completely insoluble, it was thought that by neutralizing the solution with barium carbonate better results might be secured. In the presence of the precipitate of barium sulphate the titration was still unsatisfactory, but when the solids were removed by filtration a finely divided precipitate of silver chloride was produced and a sharp end point secured.

The difficulty of filtering off the barium sulphate, however, and the small losses of potassium chloride involved, rendered the process otherwise unsatisfactory, and it was necessary, therefore, to follow the original plan of using calcium carbonate. By working with known quantities of chlorate in test cases, it was found possible to secure results involving an error of less one per cent, and in order to reduce this error as much as possible, duplicate tests for the amount of chlorate were made in all cases, and two readings for each duplicate, the second being made after the addition of a known quantity of sodium chloride solution. The average of the four readings so obtained was used in subsequent calculations.

Thus in one case:—

Titration 1.	(a)	$AgNO_3$ (corrected)	5.63^{cc}
	(b)	" "	5.64^{cc}
Titration 2.	(a)	$AgNO_3$ (corrected)	5.59^{cc}
	(b)	" "	5.62^{cc}
		Average reading	5.62^{cc}

A number of sulphates were tested and all showed the power of coagulating silver chloride. Sodium phosphate was found to act in the same manner.

The amount of chlorate changed to perchlorate was obtained by difference and the weight of oxygen necessary for the formation of the perchlorate was calculated. No determinations of the alkalinity of the residue were made.

Since the total oxygen from the decomposed chlorate either escapes as free gas or combines with other chlorate molecules to form perchlorate, there should be a correspondence between the sum of the loss of weight of the bulb and the weight of oxygen required for perchlorate, on the one hand, and on the other, the weight of oxygen from the decomposed chlorate. In the experiments it was found that the latter was always slightly in excess, except in a few cases at high temperatures where a small quantity of the salts had been carried over mechanically.

Results for one determination are given in the following:

Weight of chlorate heated — 0·5 *gms.* Temperature 500°.

1. Weight of $KClO_3$ changed to KCl = 0.1566 gr.
2. Weight of $KClO_3$ unchanged = 0.0738 gr.
3. Weight of $KClO_3$ changed to $KClO_4$ = 0.2646 gr.
4. Weight of oxygen set free in (1) = 0.0613 gr.
5. Oxygen required for $KClO_4$ = 0.0345 gr.
6. Loss of weight of bulb = 0.0260 gr.

Now the sum of (5) and (6) should equal (4)

$$0.0345 - 0.0260 = 0.0605$$
$$0.0613 - 0.0605 = 0.0008$$

In this connection is to be mentioned the continual increase in the weight of the bulbs used in these determinations which amounted in some cases to as much as 5 milligrams for one heating. It seems probable that these two phenomena are to be attributed to the same cause. Sodeau in his work with barium chlorate, J. Chem. Soc., 1900, p. 138, found that at atmospheric pressure, practically no chlorine reached the potassium iodide bulbs, through which the gases from the chlorate were passed, but that at pressures reduced to a few mm., considerable quantities of iodide were decomposed, while the alkalinity of the residue was very slightly different in the two cases. This seems to indicate that heated glass may absorb small quantities of chlorine. It is unlikely, however, that the total increase in the weight of the bulbs is due to chlorine, for an increase of 0.0020 *gms.* would indicate that 1·4% of the total chlorine had been evolved and the results of Sodeau show that this quantity is much too large. It is possible that a certain quantity of K_2O reacts with the glass to form soluble manganates, so that it seems very likely that a large part of the increase of weight is due to the absorption of oxygen.

General reasons for this may be made apparent by an examination of the method of analysis and the results obtained. The reaction under consideration may be qualitatively represented thus:

$$KClO_3 = KCl + KClO_4 + K_2O + Cl + O$$

Now in the analysis the KCl is first estimated. It is evident that the greater the amounts of K_2O and Cl, the *less* the amount of KCl, and consequently the *smaller* will be the *calculated* amount of oxygen liberated. By lessening the true amount of KCl, the amount of $KClO_4$ is increased, since this is obtained by difference and consequently the amount of oxygen required for $KClO_4$ is made greater. Thus we have the weight which is found to be greater,—namely the weight of oxygen evolved, less than its true amount, while one of the parts of the *sum*

greater than its true amount, both of which tend to reduce the discrepancy pointed out on page 19. On the other hand the absorption of chlorine and possibly of potash by the glass will increase the weight of the bulb, and therefore tend to increase the difference or discrepancy referred to. But, as it has been shown that the chlorine and potash set free are almost certainly smaller in amount than the increase in the bulbs, there is still a deficiency in the following sum: —

(Weight of oxygen for $KClO_4$ + loss in weight of bulb) to be accounted for. It appears quite possible therefore that this deficiency may be accounted for by the absorption of small amounts of oxygen.

The accompanying Table *No. 3*, contains a number of the results obtained at different temperatures. The numbers given are the actual weights found in connection with the 0·5 *gm.* of chlorate that was heated in each case. Theoretically the difference between the numbers in columns *9* and *4*, given in column *5*, should equal those in column *6*, but it will be noticed that the numbers in column *5* are always somewhat greater than those in *6*. At the same time it will be observed that the increase in the weight of the glass varies both with the temperature and the time of heating. These numbers in column *7* cannot be taken however as representing the total increase which the bulb originally received owing to the nature of the treatment of the glass in cleaning. In this process the bulbs were first heated in boiling water to heat the water contained in them and thus ensure the dissolving of the whole of the residue of $KClO_4$, etc. They were then filled with chromic acid solution and allowed to stand some time, after which they were washed successively with water, alcohol and ether. It is evident, therefore, that a certain amount of *loss* is almost certain during this treatment, so that the numbers in column *7* may frequently be too small.

The increase seems to depend also upon the glass used. In experiments conducted previous to the beginning of the series the results of which are not given in the accompanying tables, tubes were used which showed a greater increase than those of the latter series, although in both cases, soda glass was used.

Thus in the case of one bulb, the increments for five successive experiments at temperatures from about 500° to 540° are the following, expressed in milligrams:—

5·6; 2·9; 2·2; 5·6; 4·6; A total of 22·9 *mg.*

The glass was not changed in appearance until after it had been in use for some time, when portions of its inner surface showed a large number of fine checks as though the inner surface had become changed somewhat in its character. After these checks appeared the tube soon cracked, when put into the furnace, and had to be thrown away. Ow-

ing to accidents only a few of the bulbs were used long enough to show this change.

In subsequent experiments, bulbs containing pure sodium chloride and small quantities of potash were heated to 500°. In each case the turquoise blue manganates were formed and the bulb lost considerably in weight. On the other hand bulbs heated to 560°, while a slow current of pure oxygen was passed through them, did not show any increase in weight. The latter experiment was suggested by the statement of Le-Chatelier in his work on high temperatures, that heated glass absorbs small quantities of gases, but the negative result indicates that the absorption of free oxygen is too small to produce a change of weight in the bulbs used.

The first experiments were conducted at 355° and at 360° for the purpose of determining whether or not it is possible to bring about the formation of a quantity of perchlorate, without at the same time, inducing an evolution of free oxygen. Mention may be made of results obtained by Fowler and Grant, when silver oxide was heated with potassium chlorate. (J. Chem. Sec., 1890). In accordance with these results, perchlorate may be formed at the expense of the oxygen of the silver oxide, while no free oxygen is evolved. It seemed possible that a similar result might be attained without the introduction of a foreign oxide, for since potassium chlorate yields both chloride and perchlorate, together with oxygen during its ordinary decompositions, it might be expected that by gentle heating all the oxygen at first set free from the decomposing molecules would combine with other chlorate molecules. Under such conditions the only products of the reaction would be chloride and perchlorate. In all experiments conducted to test this point, however, no evidence was found of any change without the simultaneous evolution of free oxygen. At 355°, a temperature just below the melting point of the chlorate, and at 360°, where the chlorate was fused, no loss of weight occurred after the lapse of two or three hours—nor was there any change in the quantity of chlorate. Decomposition, indeed, was not found to begin below 410°, and at 420° it was so slow that at the end of three hours only 0·48% of the chlorate had been changed to chloride. Since perchlorate is not decomposed below 500°, the test at 420° may be considered one in which the changes taking place are sufficiently slow to permit the reaction under discussion if it were a possible one. It was found, however, that only a small percentage of perchlorate was formed, while about 85% of the oxygen from decomposed chlorate was evolved as free gas.

TABLE I.

Temp.	Time	$KClO_3$ CHANGED TO KCl	$KClO_3$ CHANGED TO $KClO_4$	$KClO_3$ UNCHANGED	OXYGEN EVOLVED (TOTAL = 100
400°	1 hr.	0·00	0·00	100	.....
400°	2 hrs.	0·00	0·00	100	.....
420°	1 hr.	0·48	0·14	99·38	0·205
420°	3 hrs.	1·12	0·46	98·42	0·871
440°	1 hr.	1·92	0·96	97·12	0·666
440°	2 hrs.	3·62	1·92	94·46	1·95
440°	3 hrs.	3·92	3·64	92·44	2·51
460°	1 hr.	3·82	3·36	92·82	2·36
460°	2 hrs.	.....	.....	.....	.....
460°	3 hrs.	6·59	8·30	85·11	3·07
480°	1 hr.	7·30	7·80	84·90	3·74
480°	2 hrs.	11·84	19·00	69·16	4·56
480°	3 hrs.	16·08	28·40	55·52	5·79
500°	1 hr.	15·18	26·76	58·06	5·58
500°	2 hrs.	27·88	46·34	25·78	11·98
500°	3 hrs.	31·32	52·93	15·76	13·31
510°	1 hr.	20·82	34·78	44·40	8·35
510°	2 hrs.	37·06	57·50	5·44	17·40
510°	3 hrs.	43·08	52·16	4·78	25·09
520°	1 hr.	30·46	42·86	26·66	15·36
520°	2 hrs.	.....	.....	.....	.....
520°	3 hrs.	61·58	32·60	5·94	50·18
530°	1 hr.	40·70	53·54	5·74	22·68
530°	2 hrs.	56·50	38·70	4·78	43·47
540°	3 hrs.	.....	....	.....	.....
540°	½ hr.	35·52	56·36	8·12	16·03
540°	1 hr.	46·98	46·42	7·60	30·98
540°	2 hrs.	69·24	25·04	5·72	61·39
540°	3 hrs.	85·94	10·24	3·82	83·66
550°	10 min.	29·70	50·16	20·14	12·39
550°	15 "	43·82	49·32	6·86	26·98
550°	30 "	50·62	42·90	6·48	36·25
550°	45 "	57·58	28·48	13·94	57·24
Unknown	10 "	35·54	53·48	10·98	35·12
"	15 "	38·00	53·30	8·70	37·99
"	30 "	41·74	48·72	9·54	41·52

Thus from Table 1 we find:—

Weight of oxygen from $KClO_3$ KCl = 0.0022 gr.
Weight of oxygen required for $KClO_4$ = 0.0003 gr.
Loss of weight (oxygen evolved) = 0.0017 gr.

We may conclude, therefore, that at least under ordinary conditions the formation of perchlorate takes place only during the simultaneous evolution of free oxygen.

The majority of the experiments were carried out at temperatures separated by ten or twenty degrees, beginning at 400°. At each temperature, with a few exceptions, three tests were made, lasting respectively, one, two and three hours, for the purpose of ascertaining the rate at which the reaction proceeds. The results of these experiments are expressed by the numbers in Table 1, and by the curve diagrams. In these the total quantity of chlorate heated is given the value 100, so that the weights of chlorate changed to perchlorate and chloride, as well as the weight remaining unchanged are expressed directly as percentages. It is to be observed that the *weight* of chloride or of perchlorate is not given, but the weight of chlorate that has changed to chloride or perchlorate. The oxygen is expressed in percentages of the total oxygen in the chlorate.

The numbers in Table 1 show that the reactions take place more slowly as they proceed. In other words the reactions appear to be retarded by the presence of the resulting substances. Politzin (Loc. cit.), in his investigations upon barium and calcium chlorates found that the reactions in the case of these salts, as indicated by the amount of chloride formed, are at first somewhat accelerated and then retarded. Whether there is any original acceleration with potassium chlorate can scarcely be shown by the method I have used, owing to the fact that for short periods, the time required to attain the final temperature, viz., three or four minutes, is a larger fraction of the total time than for longer periods. Original acceleration is, however, a matter of very great frequency in chemical reactions, and it probably occurs in this case. Subsequent retardation might, indeed, be expected, owing to two circumstances. In the first place the increasing amount of chloride, mixed with the chlorate results in the "dilution" of the reacting substance, and in the second place, the perchlorate formed decomposes more slowly than the chlorate at the same temperature.

It is also evident that in the majority of cases the amount of chlorate changed to perchlorate is larger than the amount changed to chloride. This may be expressed by saying that the fraction $\frac{KClO_3 - KClO_4}{KClO_3 - KCl}$ is usually greater than unity. It may reach the

value 1·75 as in decompositions at 500°. But the decompositions at 420°, 440°, and one at 460°, show on the other hand values of this fraction that are less than unity. Its values in these cases are:—

At 420° for 1 hr.	0·29
" 420° for 3 hrs.	0·41
" 440° for 1 hr. or 2 hrs.	0·50
" 440° for 3 hrs.	0·93
" 460° for 1 hr.	0·88
460° for 3 hrs.	1·26

This seems to indicate that at the beginning of the decomposition reactions, a part of the chlorate molecules undergo an atomic rearrangement, into a form which is capable of uniting with an atom of oxygen to form the stable compound potassium perchlorate. If such be the case, and if the rearrangement takes place slowly the cause of the low values of the above fraction is at once apparent. Otherwise it is difficult to see why these values should not be as high at the beginning of the reaction when the amount of unchanged chlorate is at its maximum, as at a later stage when it has been more or less diminished. That the constitution of potassium perchlorate differs essentially from that of the chlorate, is, of course, evident from its greater stability under the influence of heat, acids and reducing agents.

The numbers given in Table 1 do not express the quantities of the products in a manner which indicates the equation which is best fitted to represent the reaction, but calculations from them are given in Table 2, which are better adapted to this purpose. It was pointed out in 1885 by Dr. Teed (Proc. Chem. Soc.) that not only in the commonly used equation:—

$$2\ KClO_3 = KClO_4 + KCl + O_2$$

an erroneous one, but that no single equation will serve for all cases. Individual decompositions can, he claimed, be expressed by equations, of which the limiting ones are:

$$10\ KClO_3 = 6\ KClO_4 + 4\ KCl + 3\ O_2$$
$$\textit{and}\ 22\ KClO_3 = 14\ KClO_4 + 8\ KCl + 5\ O_2$$

This was in a large measure confirmed by Frankland and Dingwall in 1887 (J. Chem. Soc., 1887, p. 274). The equation which they found best suited to reactions which were incomplete, viz.:

$$8\ KClO_3 = 5\ KClO_4 - 3\ KCl - 2\ O_2$$

lies between the limits given by Dr. Teed.

In Table 2, the total chlorate *decomposed*, is given the value 100, and the weights of perchlorate, chloride, and oxygen, are therefore

expressed as percentages. The value for each, as demanded by the foregoing equations are given, and below are the calculated values for a number of decompositions in which none of the perchlorate had decomposed. The values are given for the oxygen in a number of cases, the first value being calculated from the actual loss of weight of the bulbs, and the second (in brackets), from the total oxygen from decomposed chlorate less the oxygen required for the perchlorate formed. In every case, indeed, the larger value for the oxygen gives a number in Table 2 nearer that required by the equations, and there is in this an additional reason for assuming that a part of the oxygen is absorbed by the heated glass.

TABLE II.

	$KClO_3$	KCl_4	KCl	OXYGEN.
$8\ KClO_3 = 5\ KClO_4 - 3\ KCl - 2\ O_2$..	100	70·7	22·8	6·5
$10\ KClO_3 = 6\ KClO_4$ and $4\ KCl - 3\ O_2$.	100	67·8	24·3	7·9
$22\ KClO_3 = 14\ KClO_4 - 8\ KCl - 5\ O_2$..	100	71·9	22·1	5·9

Temp.	Time.	$KClO_3$.	$KClO_4$.	KCl	OXYGEN.
480°	1 hr.	100	68·4	24·3	7·3
480°	2 hrs.	100	62·0	27·4	10·1
500°	1 hr.	100	72·1	21·9	5·2 (5·3)
500°	2 hrs.	100	70·6	22·8	6·3 (6·6)
500°	3 hrs.	100	70·0	22·6	6·2 (6·4)
520°	1 hr.	100	70·7	22·7	6·0 (6·4)
550°	10 min.	100	70·9	22·6	6·06 (6·4)

The majority of results evidently approximate most closely to the 8 $KClO_3$ equation, one very closely to that beginning with 22 $KClO_3$, while two of them do not correspond with any of the three.

The maximum amount of perchlorate should therefore be obtained by interrupting the reaction when, from each 100 grams of chlorate heated, about 4·5 litres of oxygen have been evolved. This relation appears to be independent of the temperature since this affects only the rate of the reaction. Decompositions which have passed the point where the perchlorate begins to break down, cannot be expressed by any definite equation.

In accordance with equation 1, viz.:

$$8\ KClO_3 = 5\ KClO_4 - 3\ KCl - 2\ O_2$$

the amount of perchlorate found is 70·7 per cent of the weight of chlorate decomposed. In this connection it is to be pointed out that it seems to be impossible to change the whole of the chlorate submitted to heat as indicated by this equation, or in other words the reaction is never complete.

TABLE III.

1 Temp.	2 Time.	3 Oxygen from $KClO_3 - KCl$	4 Oxygen for $KClO_4$.	5 Difference between (3) and (4).	6 Loss of weight.	7 Increase in weight of bulb.
440	1 hr.	0·0037	0·0007	0·0030	0·0013	0·0003
440	2 hrs.	0·0071	0·0013	0·0058	0·0037	0·0007
440	3 "	0·0076	0.0024	0·0052	0·0049	.....
460	1 "	0·0075	0·0022	0·0053	0·0046	0·0005
460	3 "	0·0129	0·0054	0·0075	0·0060	0·0008
480	1 "	0·0144	0·0051	0·0093	0·0073	.....
480	2 "	0·0232	0·0124	0·0108	0·0089	0·0017
480	3 "	0·0315	0·0185	0·0130	0·0113	0·0007
510	1 "	0·0408	0·0227	0·0181	0·0163	0·0010
510	2 "	0·0725	0·0375	0·0350	0·0340	0·0012
510	3 "	0·0843	0·0357	0·0486	0·0490	0·0015
520	1 "	0·0452	0·0255	0·0197	0·0186	0·0022
520	3 "	0·1008	0·0254	0·0754	0·0748	0·0036
530	2 "	0·1125	0·0223	0·0902	0·0901	0·0036
550	10 min.	0·0581	0·0037	0·0254	0·0242	0·0020
550	30 "	0·0990	0·0279	0·0711	0·0708	0·0032
520	45 "	0·1127	0·0186	0·0941	0·0932	0·0045

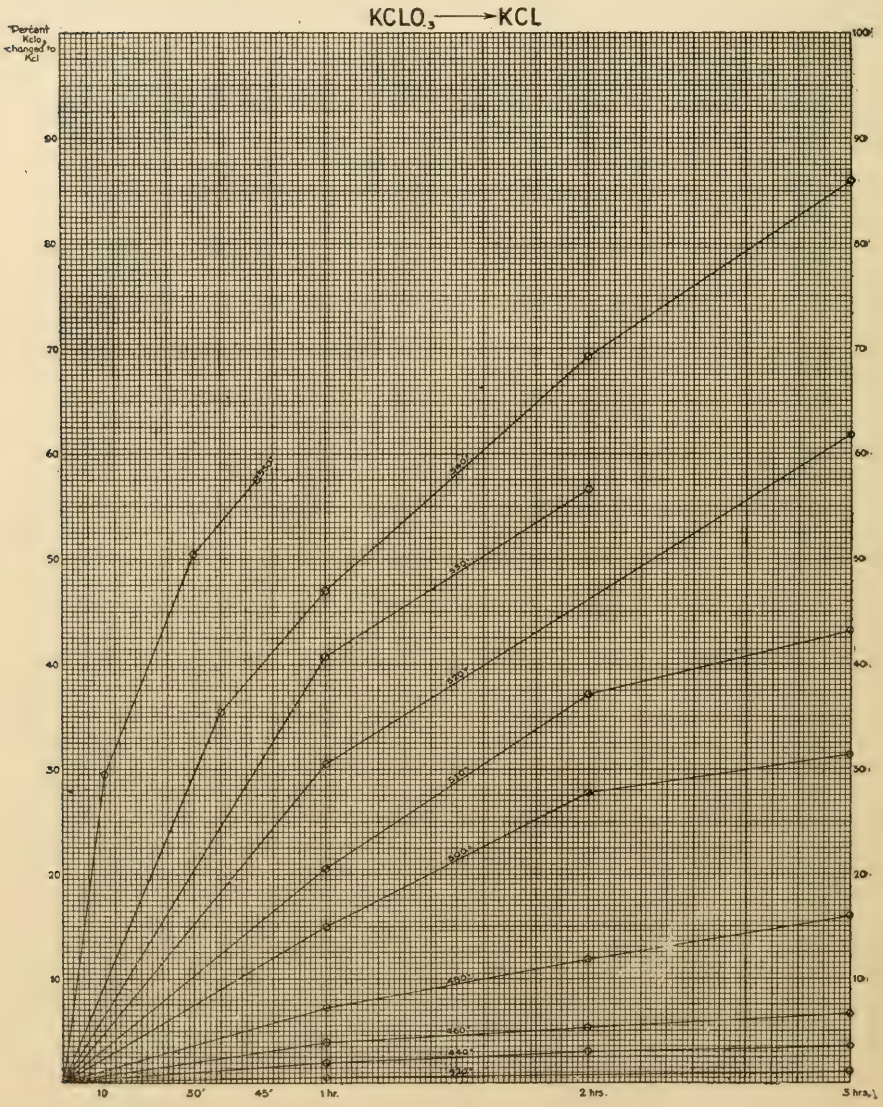
Below the temperature at which potassium perchlorate is decomposed, the reaction proceeds more and more slowly as the above condition is approached, and it seems probable that an equilibrium state is finally reached in which a certain amount of chlorate remains mixed with the products of decomposition. Above the temperature of decomposition of perchlorate, there is always a quantity of chlorate present until the whole of the oxygen has been evolved. Evidence of this is to be found in the numbers of Table 1, where it may be seen

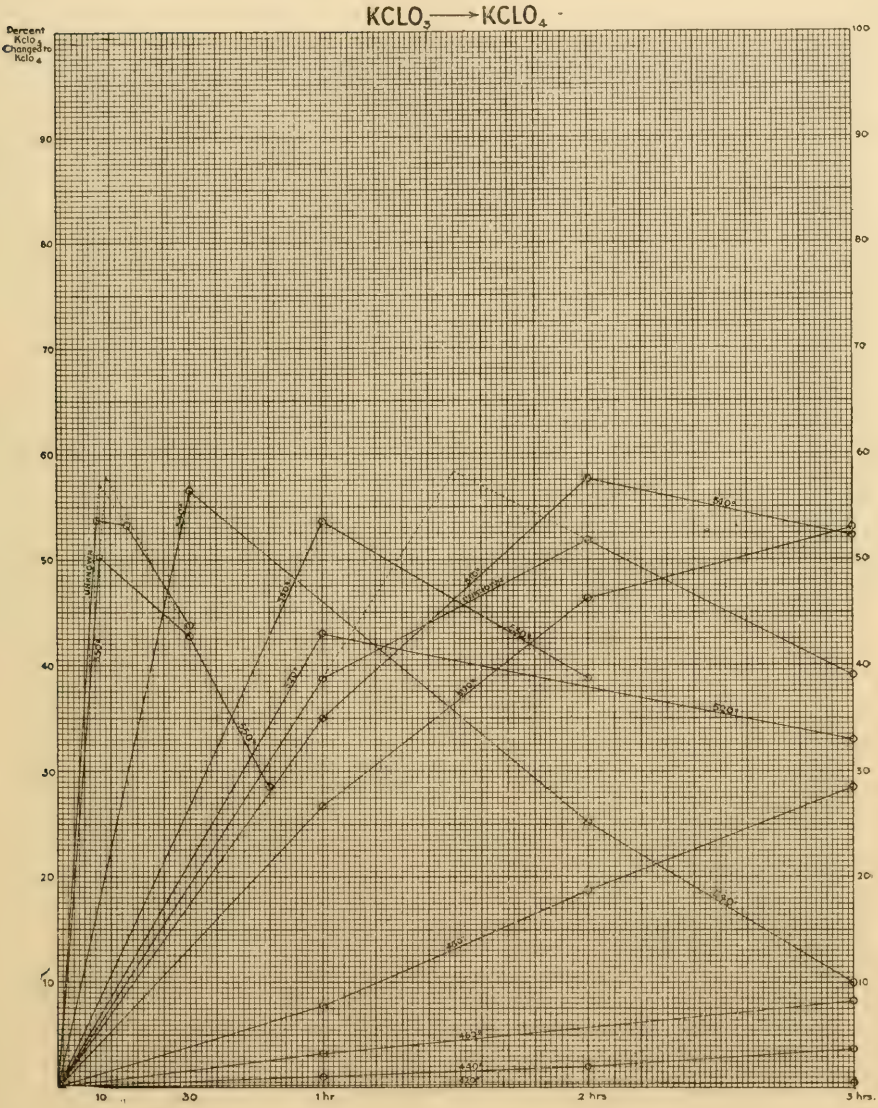
that even when most of the perchlorate has been decomposed, a considerable amount of chlorate remains. This is due to the fact, discovered by Dr. Teed, and afterwards confirmed by Frankland and Dingwall, that potassium perchlorate in its decomposition yields potassium chlorate as one of its first products. It might be expected therefore, that at temperatures above 500° little or no perchlorate would be formed, or, if formed, that it would immediately decompose to chlorate. Such, however, is very far from being the case, as may be seen in the diagram representing the formation of perchlorate. From this we see that, whatever the temperature may be, the same percentage of perchlorate is formed at some stage of the reaction, except in those cases where, owing to the low temperature the reaction is very slow. The perchlorate seems to reach a maximum of about 65 per cent of the total chlorate heated. In the diagram we have represented the weight of chlorate changed to perchlorate, and this multiplied by the fraction $\frac{138 \cdot 6}{122 \cdot 6}$ gives the actual weight of the perchlorate. The highest number given in the diagram is 57·5, and, consequently, the greatest percentage of perchlorate actually found is $57 \cdot 5 \times \frac{122 \cdot 6}{138 \cdot 6} = 65$. It is possible that this is not the highest percentage that may be formed, for, owing to the conditions of the experiment it is manifestly almost impossible to interrupt the decomposition at the exact point at which the perchlorate content is highest. But a number of results obtained at different temperatures approximate to this value, and, in two cases, lines of extrapolation indicate practically the same height on the diagram as the maximum point.

It seems beyond doubt, therefore, that, whatever the temperature may be, the reaction at first proceeds toward the formation of a definite maximum of perchlorate. If the temperature be sufficiently high, the perchlorate is then decomposed into chlorate, chloride, and oxygen. The only apparent difference in these cases is the difference in the rate at which the reactions take place. At 550° the reaction has advanced as far at the end of 15 minutes as in three hours at 500°. The difference in rate between decompositions at 500° and decompositions at 550° is very much greater than that between those at 450° and those at 500°. A similar increase in rate for the next 50° would mean that the reaction had become explosive. Whether such an advance takes place has not been tested, but it is improbable that it does so.

It would doubtless be incorrect to suppose that none of the perchlorate is decomposed until the maximum amount has been formed.

It is much more probable that the results shown in the perchlorate diagram are due merely to the difference between the rate of formation and the rate of decomposition of perchlorate until an equilibrium ratio between the amount of perchlorate and the amount of chlorate has been reached.




KCLO3 ⟶ KCLO4
Percent KClO3 Changed to KClO4
10
30
1 hr
2 hrs
3 hrs.

III.— *On the Resistance of a Hydrated Electrolyte, and the relation to the Density-Concentration Curve.*

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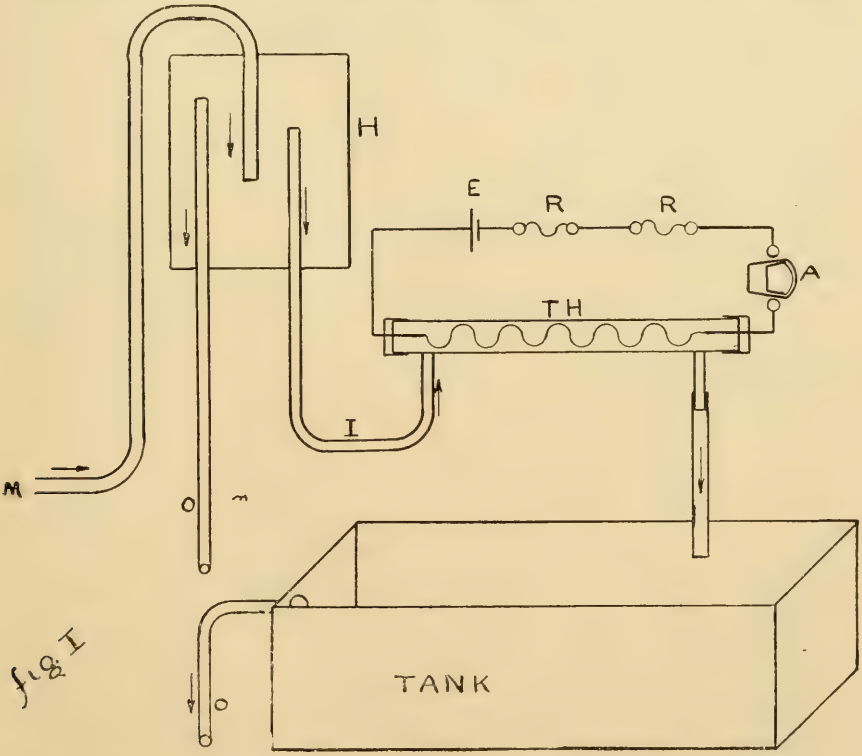
AND

J. GUY W. JOHNSON, M.A.
McGill University, Montreal.

(Read May 19th, 1903.)

Since the communication[1] to the Royal Society last year in which we described the application of the fall of potential method to the measurement of the resistance of an electrolyte in motion, we have



measured the resistance of KCl and K_2SO_4 at different concentrations by the same method. Our object in continuing the work was to deter-

[1] Trans. Roy. Soc. Can., VIII, 135 (1902).

mine whether the change in the density curves for these salts could be accounted for by a change in dissociation of the hydrated salt. Such a change was indicated in the case of $MgCl_2$, but before basing any conclusions on these results we desired to study the matter further Our apparatus differed from that previously described by us only in the addition of a continuous electrical heating device, by means of which the temperature in our water bath could be maintained constant. We show a diagram of this apparatus in figure I.

A glass tube *TH* is fitted with a heating spiral of platinoid or manganin wire, which is connected at each end with heavy copper leads. A continuous current of water flows through the tube into the tank from a constant level device at *H*. This constant level device is fed from the mains through the tube *M* and overflows at *O*. The water, which is cooler than the desired temperature in the tank, is heated by the passage of a current from the 100-volt experimental circuit *E*. Rheostats at *R* serve to adjust the current which is read off on the ammeter at *A*. Two adjustments are possible, and both alter the temperature of the tank. The head *H* may be raised or lowered, and the current in *TH* may be adjusted at *R*, and observed on the ammeter. By knowing what a change in head or current will produce on the temperature of the tank, it was possible to compensate quickly for the changes in temperature of the tap water.

The salts we used in our work were Merck's best, and solutions were made with the purest distilled water. The strength of each solution was adjusted roughly by means of a hydrometer, and then after the measurements of resistance had been made, it was obtained accurately by a pyknometer.

Table 1 contains our results for K_2SO_4 which we obtained at a constant temperature of 25·5° C.

TABLE I. K_2SO_4 AT 25·5° C.

d	R	W	DIFF. D	(W+0·9972)—d
1·0767	117·63	·1019	·00231	·0224
1·0658	132·21	·0871	·00162	·0185
1·0594	146·50	·0788	·00119	·0166
1·0509	172·94	·0671	·00062	·0140
1·0408	207·01	·0542	·00026	·0106
1·0284	287·80	·0380	·00000	·0068
1·0219	367·36	·0298	·00000	·0051
1·0131	555·64	·0186	·00000	·0027
1·0089	756·69	·0134	·00000	·0017
1·0060	1112·60	·0099	·00000	·0011
1·0048	1643·23	·0083	·00000	·0007

In the column under w we give the concentration in grammes per cubic centimetre. These values are obtained by comparison with the table of values in the original paper by one of us with Mr. A. P. Scott.[1] They correspond to a slightly lower temperature, but that will not alter the relative values which we are concerned with. In the last column we give the difference between a theoretical density, calculated by adding w to the weight of a cubic centimetre of water, and the real density observed. This gives the weight of water displaced by the salt. The next to last column contains the deviations from a theoretical

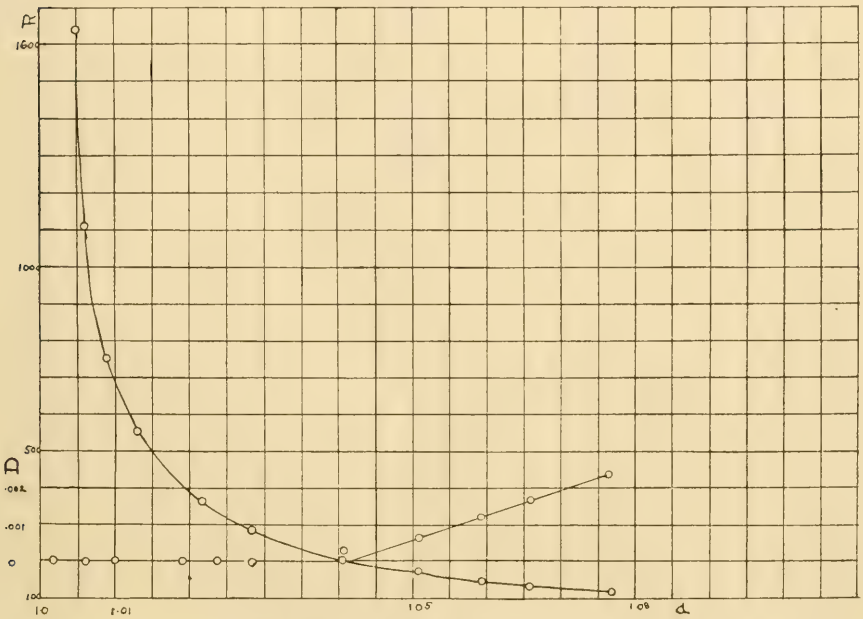


Fig 2. K_2SO_4. Curves

formula assuming that one molecule of salt displaces two molecules of water. This holds very closely over a considerable range, but for stronger solutions more water is displaced by the added salt. By plotting this column with the density we obtain the curve given in figure 2. This illustrates the change in the density curve very well, and suggests some change in relation between the salt and water molecule. We plot on the same diagram the resistance with the density. The regularity of this curve shows that no change in dissociation, in so far as it would be shown by a change in the conductivity, can account for the discontinuity.

[1] Jour. Phys. Chem., 2, 536 (1898).

In table 2 we give the results for *KCl* and plot these in Fig. 3.

TABLE II. *KCl.* AT 25·5° C.

d	R	W	DIFF. D	(W+0·0972)—d
1·1466	34·26	·3388	·0270	·1884
1·1164	41·73	·2662	·0196	·1470
1·1056	44·94	·2416	·0177	·1332
1·0896	52·76	·2043	·0144	·1119
1·0679	67·94	·1511	·0086	·0804
1·0552	82·42	·1247	·0076	·0667
1·0435	103·12	·0986	·0058	·0523
1·0348	127·76	·0796	·0047	·0420
1·0246	180·76	·0562	·0028	·0288
1·0129	301·26	·0313	·0016	·0156
1·0058	651·53	·0162	·0009	·0076
1·0027	1402·81	·0097	·0006	·0042

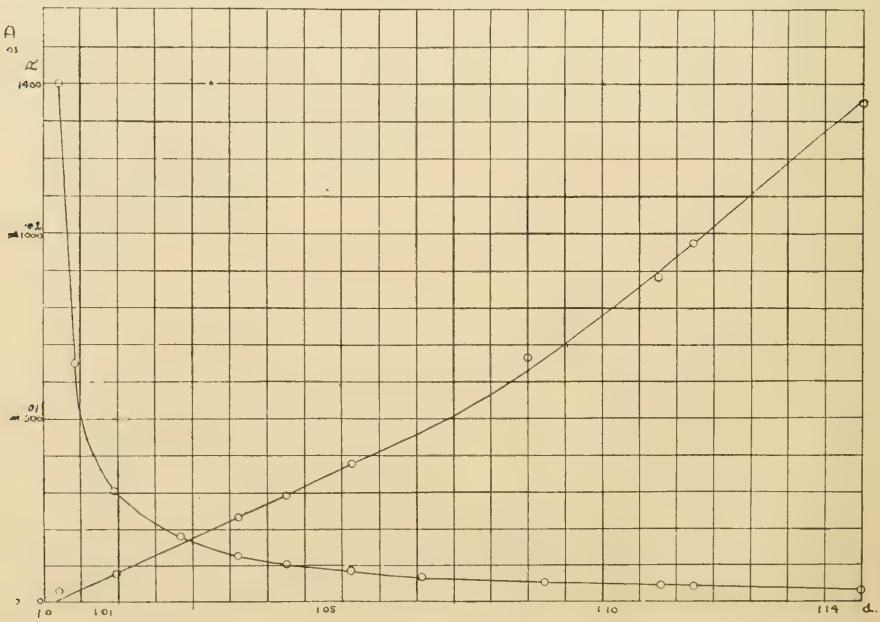


Fig 3. KCl Curves

Only a slight indication of a change in relation is shown for the *KCl* concentration curve, and here again the resistance curve is very regular. The change in the density curves for a large number of salts,

which has been observed, cannot, we think, be attributed to a change in dissociation of the hydrate as was first suggested.[1] It is to be accounted for by some change in the relation of the salt and water molecule, which would not necessarily produce any change in the electrical conductivity. We are not in a position at present to state the nature of this relation definitely. Previous determinations of density, which have been made, show a similar change in relation when reduced on the same plan, but as a rule values of densities quoted have been read off from a smoothed curve and therefore miss the point in question.

[1] Trans. Roy. Soc. Can., VI., 75 (1900).

IV.—*On the Radioactivity of Metals Generally.*

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AND

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(Communicated by President Loudon, and read May 19th, 1903.)

Introduction. In a former paper by the authors[1] on the conductivity of a mass of ordinary air confined within a large metallic receiver it was shown that about 37 per cent of the conductivity was due to an exceedingly penetrating radiation which, traversing the air in the room, passed through the walls of the receiver. It was also shown that the conductivity of fresh atmospheric air, after being confined in a metallic cylinder, rapidly fell to a minimum value, that a gradual rise then took place, and that a steady state was reached after some hours.

On account of the known decay of the constituent in atmospheric air responsible for excited radioactivity, the fall in the initial conductivity was attributed to its presence in the cylinder, and the subsequent rise to an emanation of a similar character given off by the walls of the containing vessel; the steady state representing a condition of equilibrium, where the rate of decay of this emanation was equal to the rate at which it was produced.

It was also pointed out that the limiting value of the conductivity thus reached varied with the metals forming the walls of the receiver. In experiments with lead, tin and zinc the conductivity was highest with lead and lowest with zinc. In view of these results, and on account of the known complex character of the radiation from such highly radioactive substances as radium and thorium, a series of experiments was made to investigate still further the radioactivity of ordinary metals.

As a result of these experiments, we find that when a cylinder of any metal is enclosed within a second of the same material, insulated from it, and surrounded by air or other gases, it gradually acquires a negative charge, and after a short time reaches a state of equilibrium at a definite potential below that of the enclosing cylinder.

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[1] Phys. Review, Vol. XVI., No. 3, p. 184, 1903, and University of Toronto Studies, Physical Science Series No. 2.

So far the experiments made indicate that the negative charge acquired by the cylinder results from a process in which an excess of positively charged corpuscles is expelled from its surface. This process is probably identical with the *a* radiation observed by Rutherford[1] and others in the highly radioactive substances radium, thorium and uranium, and experiments are now being made by the writers to determine its relation to the effect observed by Guthrie[2] and developed by Elster and Geitel,[3] J. J. Thomson,[4] Richardson,[5] Strutt[6] and others, that a metal, platinum for example, when heated to a dull red will discharge a negatively charged body placed near it, but not one positively charged.

Experiments—Metal Effect. In these experiments cylinders of aluminium, zinc, lead, tin and copper were used, the outer ones being

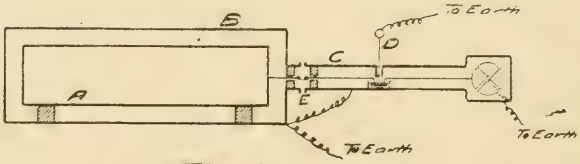

Fig. 1.

120 cms. in length and 24 cms. in diameter, and the inner 110 cms. in length and 19 cms. in diameter. The measurements were made with a quadrant electrometer whose sensitiveness was such as to give a deflection of 1,000 mms. on a scale situated at one metre from the needle for a potential of one volt.

The apparatus and its connections are shown in Fig. I., where A and B represent the cylinders of the metal examined. The wire which led from the inner cylinder to the electrometer was of brass and was surrounded by a tube of the same metal to screen off induction effects. This tube, as well as the outer cylinder B and the metallic screen over the electrometer, was kept joined to earth during an experiment. The inner cylinder and the free quadrants were earthed by means of the brass rod D, which carried a platinum tip and made contact with a small platinum plate attached to the connecting wire as shown in the figure. The tube was provided with a small opening so arranged that the withdrawal of the rod D did not affect the capacity of the system. Plugs and supports of paraffin wax provided insulation for the apparatus.

[1] Phil Mag., Feb., 1903, p. 177.
[2] Phil. Mag. [4], 46, p. 257, 1873.
[3] Wied. Ann., 38, p. 27, 1889.
[4] Phil. Mag., XLIV., 1897, p. 203.
[5] Proc. Camb., Phil. Soc., XI., p. 286.
[6] Phil. Mag., Vol. IV., Sixth Series, 1902, p. 98.

In making a measurement the connecting rod D was withdrawn and the apparatus left intact. The inner cylinder B and the free quadrants then slowly acquired a negative charge which finally reached a limiting value. This value varied with the metal used in the construction of the cylinders A and B, but did not vary with samples of the same metal obtained from different sources. It was also the same whether the needle of the electrometer was positively or negatively

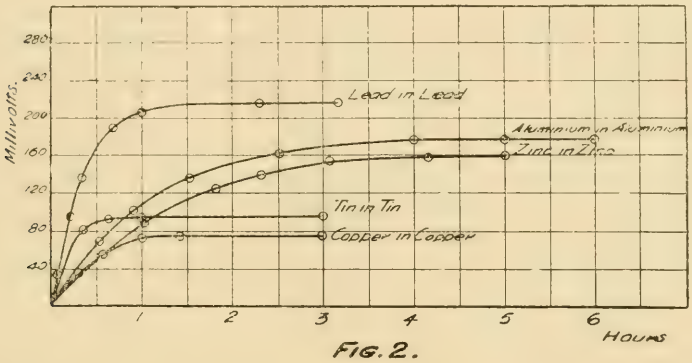

FIG. 2.

charged. With lead, tin and copper the limiting value was reached in about one hour, but with aluminium and zinc not before four or five hours had elapsed.

Readings for pairs of cylinders of these metals at 16°C are set forth in Fig. II., where curves are drawn with the time expressed in hours for abscissæ and the negative potential attained by the inner cylinder expressed in millivolts for ordinates. The limiting values for the different metals are as follows:

	Millivolts.
Aluminium	178
Zinc	160
Lead	216
Tin	95
Copper	73

In experimenting with lead cylinders the pressure of the air in B was reduced from 750 mms. to 20 mms. of mercury and a slight drop in the limiting potential of about three or four per cent was observed.

Measurements were also made with different gases at atmospheric pressure between these cylinders, and it was found that the limiting potential slightly increased with the density of the gas used. A set

of readings taken with hydrogen, air, oxygen and carbon dioxide is as follows:

	Millivolts.
Hydrogen	205
Air	216
Oxygen	220
Carbon Dioxide	233

Experiments were also made with lead by varying the diameter of the inner cylinder. With cylinders 19, 13 and 4 cms. in diameter respectively no difference was observed in the limiting potential, but the time required to reach it slightly increased with the use of cylinders of smaller diameter.

The experiments were also varied by placing the lead cylinders in a tank filled with water, the surrounding layer of water having a thickness of 13 cms. Under these conditions the limiting potential was found to be unchanged.

It was also observed that this metal effect was produced when Röntgen or Becquerel rays were allowed to traverse the cylinders. With these radiations, however, the limiting negative potentials were reached in the course of a few seconds and varied but little from the values obtained for the different metals under ordinary conditions. A small quantity of radium chloride of activity 1,000 confined in a glass phial was used as the source of Becquerel rays, and was placed, in the experiment, on a support close to the outside of the cylinder B. The effect was also produced with a quantity of uranium oxide placed near the cylinder, but a much longer time was required than with the radium to reach the steady state.

The following are the values of the limiting negative potentials obtained under the different conditions:—

Metal	Negative Potential in Millivolts		
	Natural Radiation.	Röntgen Rays.	Becquerel Rays.
Aluminium	179	179	179
Zinc	160	176	180
Lead	216	175	201
Tin	95	98	100
Copper	73	72	69

Volta Effect. It is evident that, with cylinders of different metals, the arrangement shown in Fig. I afforded a means of exhibiting the

Volta effect and of approximating to a measure of the contact differences of potential for a series of metals.

With the rod D in position a difference of potential would exist between the cylinders A and B. Its withdrawal would be followed by a gradual equalization of these potentials which would result in a charge being communicated to the connecting wire and the free quadrants. This again would set up a current to the surrounding tube C, and finally the free quadrants would attain a steady potential, the current between the cylinders being equal to that between the connecting wire and its surrounding tube. The potential assumed by the free quadrants under these circumstances, while approximating to, would be less than the contact difference of potential for the metals used in the two cylinders.

The values obtained in this way for any two given metals, while differing in sign, should be numerically the same, whichever metal was

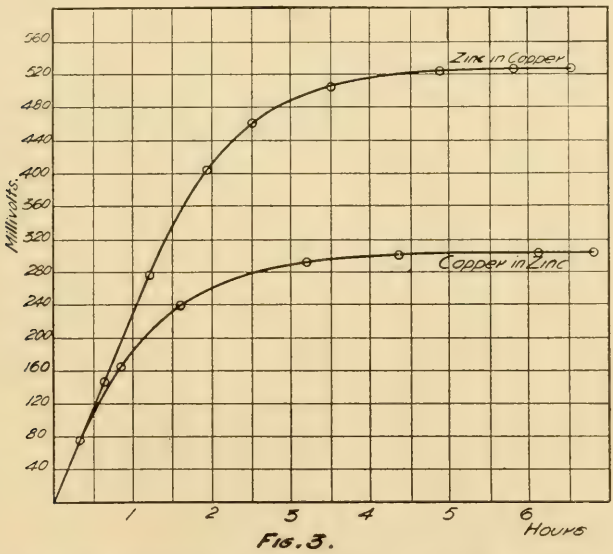

Fig. 3.

used for the inner or outer cylinder. But on trial with a number of pairs of metals, it was invariably found that the readings differed when an interchange was made of the metals in the cylinders. This is illustrated by the curves in Fig. III., which give the results for the metals, zinc and copper, the upper representing the negative potentials acquired by the quadrants with an inner cylinder of zinc, and the lower the positive potentials with one of copper. The final potentials, it will be seen, are 527 and 304 millivolts respectively.

This result finds its explanation in the metal effect described above. We have shown that, with zinc cylinders, the inner, in virtue of this

effect, attains a potential of 160 millivolts below that of the outer, while with copper the corresponding value is 73 millivolts. If then we suppose the two "effects" to act concurrently, the final readings observed with the zinc and copper cylinders will represent their algebraic sum. Denoting the metal effect for zinc by x and that for copper by y and the Volta effect for the two metals by V, we have

	Limiting Potential (millivolts)
$V + x =$	527
$V - y =$	304
$x =$	160
$y =$	73

from which we obtain the values 367 and 377 millivolts for the contact difference of potential for the metals zinc and copper, an agreement sufficiently close to confirm our hypothesis.

Similar measurements have been made with all combinations of the metals aluminium, zinc, lead, tin and copper, taken in pairs, with

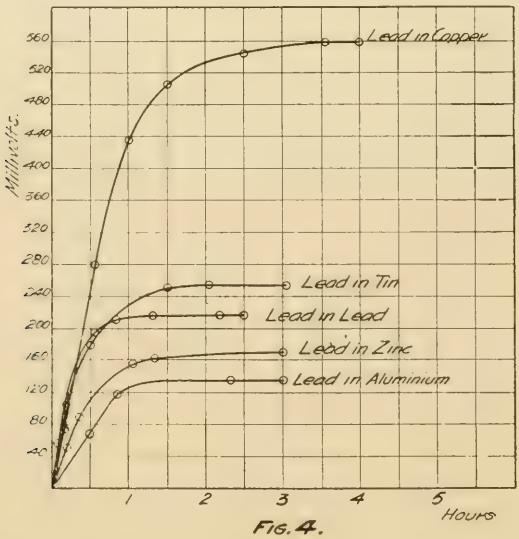

FIG. 4.

uniformly close results, the volta effects obtained in this way being in every case proportionately less than the generally accepted values.

As an additional illustration of these measurements, the curves representing the results obtained with an inner cylinder of lead and an outer of each of the metals are shown in Fig. IV. Combining the limiting potentials of these with the metal effect for lead, 216 milli-

volts, the potential differences for the different pairs of metals are as follows:—

	Difference of Potential (millivolts)
Aluminium, Zinc	35
Lead	45
Tin	37
Copper	306

values which are considerably below those generally adopted.

Conclusions. The gas between the two cylinders always contains a number of ions, and, on account of the greater rate of diffusion of the negative ions, it is possible that an excess of these would impinge upon the inner cylinder in a given time and thus leave it negatively charged. The resulting potential, however, should be the same for all metals on this hypothesis.

Again, it is possible that the very penetrating radiation which is present in ordinary air may consist of negatively charged matter and that the negative charge taken up by the inner cylinder represents the amount of this radiation intercepted by it. But the high value obtained for aluminium, together with the results obtained with Röntgen rays, is against this conclusion.

It seems rather that a process is going on at the surface of the metal, whereby an excess of positively charged corpuscles is being continually emitted, and that the steady state attained represents a condition of equilibrium in which the current between the cylinders is equal to rate of efflux of the positive charges.

V.—*The Oxalates of Bismuth.*

By DR. F. B. ALLAN.

(Communicated by Prof. W. Lash Miller, and read May 19th, 1903.)

Neutral oxalate of bismuth Bi_2O_3 3 C_2O_3 $7\frac{1}{2}$ H_2O was prepared by Souchay and Lensson (Ann. der Chem., 105, 245), by adding oxalic acid to a solution of bismuth oxide in nitric acid. It was also prepared by Muir (Jour. of the Chem. Soc. 1878, 193), who gave it the formula Bi_2O_3 3 C_2O_3 6 H_2O. Swartzenburg (Ann. der Chem. 64, 127) boiled bismuth oxide with acid potassium oxalate and the product, dried at 100°, had the composition Bi_2O_3 3 C_2O_3 4 H_2O. If this neutral oxalate be boiled repeatedly with water, a basic salt is formed to which various formulæ have been given—Bi_2O_3 2 C_2O_3 $1\frac{1}{2}$ H_2O (Heintz, Pogg, Ann. 63, 90) Bi_2O_3 2 $C_2O_3H_2O$ (Souchay and Lensson) and Bi_2O_3 2 C_2O_3 (Muir).

Owing to the easy decomposition of the neutral oxalate by water, I have not been able to obtain it entirely free from basic salt. This oxalate was used in a study of the basic oxalates similar to the researches by the author on the nitrates (Amer. Chem. Jour., 25, 307), and sulphates of bismuth (Amer. Chem. Jour., 27, 284). The salt was stirred with water and with oxalic acid solutions in a constant temperature bath. Owing to the length of time required to get equilibrium in monovariant systems, only divariant systems containing a gaseous, a liquid, and one solid phase have been obtained.

At 50° a basic salt, in which $\frac{Bi_2O_3}{C_2O_3}=3.23$, was found to be in equilibrium with oxalic acid solutions up to .085 normal and in stronger solutions the solid phase was the neutral salt. This basic salt was air-dried and analyzed, the bismuth being determined as the sulphide and the oxalic acid in the filtrate by titration with permanganate.

	Calculated for Bi_2O_3 2 $C_2O_3H_2O$	Found.
Bi_2O_3	74.16	74.14
C_2O_3	22.97	23.00
H_2O	2.87	(2.86)

Miller and Kenrick (Trans. Royal Soc. Canada, 1901), have shown that the number of possible phases in a given system is not changed if a new constituent be added to the liquid phase provided that this new constituent does not pass into the solid phase. This condition is

fulfilled if dilute ammonia is stirred with Bi_2O_3 2 $C_2O_3H_2O$ and therefore a divariant system still contains but one solid phase. Preliminary experiments showed that the new basic salt obtained in this way was acted on by quite dilute ammonia and in order to get this solid phase in equilibrium with a larger range of concentrations of ammonia, it was necessary to reduce the efficiency of the ammonia in the reaction. This can be done by adding to the solution any ammonium salt, thus decreasing the amount of ionization and as ammonium oxalate is one of the products of the reaction it is the best salt for the purpose.

At 75°, Bi_2O_3 2 $C_2O_3H_2O$ was stirred with .028 normal ammonium oxalate and ammonia of varying concentrations and a new basic salt, in which $\frac{Bi_2O_3}{C_2O_3} = 9.69$, was found to be in equilibrium with ammonia solutions up to .115 normal. This salt when air-dried had the following composition:—

	Calculated for 3 Bi_2O_3 2 C_2O_3	Found.
Bi_2O_3	90.64	90.42
C_2O_3	9.36	9.47

When Bi_2O_3 2 $C_2O_3H_2O$ was stirred with stronger ammonia or potassium hydroxide, bismuth oxide was formed and there was no indication of the formation of another basic oxalate.

Souchay and Lensson have described the following double oxalates $Bi_2\ (C_2O_4)_3\ 7\ K_2C_2O_4\ 24\ H_2O$, $Bi_2\ (C_2O_4)_3\ 11\ K_2C_2O_4\ 24\ H_2O$ and $Bi_2\ (C_2O_4)_3\ 15\ (NH_4)_2 \cdot C_2O_4\ 24\ H_2O$.

They dissolved bismuth oxalate in concentrated hot solutions of the alkaline oxalates and the double salts crystallized on cooling the solutions. Results obtained by stirring bismuth oxalate with ammonium oxalate and with potassium oxalate threw doubt on the existence of these complex double salts and Souchay and Lensson's experiments have been repeated and the salts obtained were analyzed by Messrs. DeLury and Phillips.

A 4 per cent solution of ammonium oxalate was boiled with bismuth oxalate, using a reflux condensor, for half an hour, filtered hot, and the microscopic crystals formed on cooling were dried, under pressure, between paper. The ammonia was determined by boiling with potash and titrating the solution which distilled over.

	Calculated for $Bi_2\ (C_2O_4)_3\ (H_4)_2\ C_2O_4\ 8\ H_2O$	Found.
Bi_2	43.93	44.30
C_2O_4	37.08	36.85
NH_4	3.81	3.78
H_2O	15.18	(15.07)

The high value found for bismuth and the corresponding low values for oxalic acid and ammonia may be due to imperfect filtering or to a slight admixture of basic bismuth oxalate. This salt has not been previously described.

The preparation was then repeated using an ammonium oxalate solution saturated at 25° and the double salt obtained at 50° gave 3.85 per cent NH_4 and was identical with that previously analyzed. When this solution was cooled to room temperature two kinds of crystals were deposited which under the microscope were identified as this double salt and ammonium oxalate.

Bismuth oxalate was dissolved in a 20 per cent solution of potassium oxalate and the double salt obtained consisted of small white crystals. After the removal of the bismuth from the solution of the salt in hydrochloric acid the filtrate was evaporated and ignited and the potassium weighed as potassium chloride.

Calculated for $Bi_2\ (C_2O_4)_3\ K_2C_2O_4\ 9\frac{1}{2}\ H_2O$		Found.
Bi	40.90	40.91
C_2O_4	34.56	34.54
K	7.69	7.69
H_2O	16.81	(16.86)

21 per cent and 23 per cent solutions of potassium oxalate gave the same double salt, but the deposit from a 26 per cent solution, at 50°, contained 36.1 per cent C_2O_4 and that from the same solution on cooling from 50° to room temperature contained 51.9 per cent C_2O_4 and these are probably mixtures of the double salt and potassium oxalate. Svensson (B, 3, 314)has described a double salt having the composition $Bi_2\ (C_2O_4)_3\ K_2C_2O_4\ 2\ H_2O$.

There is no evidence of the existence of the double salts described by Souchay and Lensson and the substances analyzed by them appear to have been mixtures.

In this paper three new componds have been described—3 Bi_2O_3 2 C_2O_3, $Bi_2\ (C_2O_4)_3\ (NH_4)_2\ C_2O_4\ 8\ H_2O$ and $Bi_2\ (C_2O_4)_3\ K_2C_2O_4\ 9\frac{1}{2}$ H_2O.

VI.—*Researches in Physical Chemistry carried out in the University of Toronto during the Past Year.*

Communicated by PROF. W. LASH MILLER.

(Read May 19th, 1903.)

1. *The Oxalates of Bismuth:—Dr. F. B. Allan.* A study of the reactions between bismuth oxalate and water, and between bismuth oxalate and ammonia, from the point of view of the Phase Rule. Published in full in this volume of the Society's proceedings.

2. *The Chemical Kinetics of the system: Potassium iodide, ferrous sulphate, chromic acid:—Miss C. C. Benson.* Miss Benson's paper on the rate of oxidation of ferrous sulphate by chromic acid, referred to last year, has since appeared in the Journal of Physical Chemistry (vol. VII., p. 1), and the research has been extended to include the rates of oxidation of potassium iodide and ferrous sulphate in solutions containing both. The results cannot be brought into harmony with the requirements of the "peroxide theory" advocated by Manchot and others; but can, for the most part, be explained by a new theory—the "Ferroiodion Theory." The paper will appear in the May number of the Journal of Physical Chemistry.

3. *The composition of the surface layers of solutions of Amyl Alcohol in Water:—Miss C. C. Benson.* As the surface tension of water is greatly diminished by adding a minute quantity of Amyl alcohol, it seemed possible that the surface layers contained more of the alcohol than the body of the liquid. Two years ago, at the suggestion of Dr. Kenrick, Miss Benson made analyses of the froth produced by shaking aqueous solutions of amyl alcohol, and recently by the aid of an improved apparatus, has been able to show that in the froth — where the percentage of "surface layer" is greater, the percentage of amyl alcohol also is greater than in the body of the solution. The paper has been sent to the Journal of Physical Chemistry for publication.

4. *The Rate of Oxidation of Potassium Iodide by Chromic Acid at 0° and at 30°:—Mr. Ralph E. DeLury.* Experiments undertaken (in connection with those of Miss Benson) to throw light on the remarkable catalytic action which ferrous salts exert on the reaction between

chromic acids and iodides. The rate is very closely proportional to the concentration of the bichromate, and to the square of that of the acid; the effect of the iodide can be expressed by a formula of the form $dx/dt = mC + nC^2$. The temperature coefficient of the rate is much lower than that of any other reaction yet studied. The paper has appeared in the April number of the Jour. Phys. Chem.

5. *The Rate of the formation of Iodates in alkaline solutions of Iodine:—Mr. E. Forster.* This reaction has already been studied by Schilow (Zeit. phys. Chem., 16) who, however, completely overlooked the action of the potassium iodide on the rate. In colourless solutions (excess of potash) the rate is proportional to the concentration of the potassium iodide, to the square of the amount of iodine added, and to the reciprocal of the concentration of the potash. In brown solutions (for which a special method of analysis had to be devised) the rate increases with increase in the concentration of the potash and is retarded by potassium iodide. These facts point to the participation of hypoiodous acid in the reaction. The experiments are not yet completed.

6. *The "melting" of Sodium Acetate:—Mr. Green.* The crystals deposited from melted sodium acetate trihydrate were analyzed and found to consist of the anhydrous salt. The results of earlier analyses, (Zettnow, 1866), which led to the crystals in question being considered as a lower hydrate, must be ascribed to the difficulty of separating them from the supersaturated solution without bringing about deposition of the trihydrate. The solubility curves of the trihydrate and of the anhydrous salt have also been determined. The so-called "melting point" is the temperature at which the two curves cross.

7. *An acid Ferrous Sulphate:—Mr. R. E. Hore.* Experiments carried out under the direction of Dr. F. B. Kenrick.

8. *The Rate of Migration of the Ions in solutions of Acetic Acid:—Mr. J. W. McBain.* One of the earliest triumphs of the van 't Hoff-Arrhenius theory of solutions consisted in calculating the effect of dilution on the conductivity of acetic acid. The calculation in question assumes that the ions in the solutions are $\overset{+}{H}$ and $\overset{-}{C_2H_3O_2}$, and their rates of migration (obtained from determinations of the conductivity of hydrochloric acid and of sodium acetate) are made the basis of the computation. Mr. McBain's measurements of the transference

numbers in solutions of acetic acid (up to the present no similar measurements have been made with any of the weaker acids) give results which are totally at variance with these assumptions, and which may throw light on discrepancies observed elsewhere when the theory of electrolytic dissociation has been pushed to extremes.

9. *The Ferrous Sulphates and their Hydrates:—Dr. F. B. Kenrick.* A study of the system FeO, SO_3, H_2O, from the point of view of the Phase Rule, leading to a systematic cataloguing of the various hydrates and acid salts, and a determination of the conditions under which they can exist. When working with solutions in concentrated sulphuric acid, it was found impossible to dry the crystals without risk of decomposing them, but by dissolving ammonium sulphate in the mother-liquor, and determining ammonia as well as iron and sulphuric acid, the amount of mother-liquor adhering to the crystals could be ascertained.

10. *The bactericidal action of solutions of Phenol containing salts, and the chemical potential of Phenol in the solutions:—Prof. W. Lash Miller and Prof. J. J. MacKenzie.* Solutions of various quantities of Phenol and salts in water were shaken with Toluene and the distribution of the Phenol between the two solvents determined. The rate at which Anthrax spores die in the same solutions was then determined. The rate seems to be the same in all solutions that are in equilibrium with the same solution of Phenol in Toluene, and is increased by increase in the concentration of either Phenol or sodium chloride. The experiments are not yet finished.

11. *A convenient integral form of the Equations of Chemical Kinetics:—Prof. T. R. Rosebrugh and Prof. W. Lash Miller.* A partial abstract of the contents of this paper is contained in "Numerical values of certain Functions involving e^x" appearing in the present volume of these Proceedings.

VII.—*Note on the application of Fourier's Series to the determination of the forms of Cams to fulfil given conditions of displacement, velocity and accleration.*

By E. G. COKER, M.A., (Cantab.), D.Sc. (Edin.)

Assistant Professor of Civil Engineering, McGill University, Montreal.

(Communicated by Dr. H. T. Bovey, and read May 19, 1903.)

The applications of cams for transmitting and modifying motion are extremely varied on account of the ease with which any finite displacement of one piece with regard to another can be produced, and by suitably combining cams a tracing point can be made to occupy successively any point on a curve in a plane, whether non-intersecting or otherwise. This was early shown by Mr. Cowper, who in a lecture before the Royal Institution arranged a model in which the tracing point produced a curve forming the letters R. I., and other more complicated forms have been produced since.

In general cams are designed to produce given displacements only, and their forms are obtained by various artifices. If the required displacement of the point considered be marked upon a plane in relation to the angular displacement of the cam from a fixed zero line, then the curve of displacements is evidently a one-valued function of the angle in general, but there may be finite discontinuities corresponding to a sudden rise or fall in the motion of the follower. If, therefore, a predetermined motion is marked out in rectangular co-ordinates, the required cam surface is at once produced by wrapping this curve round a right circular cylinder, the periphery of which is equal to the length along the axis of x corresponding to a complete period of the displacement. This mode of the formation of a cam upon a cylindrical surface has this advantage, that the inclinations of the cam curve to lines parallel to the axis of y, and to the generating lines of the cylinder are equal. For motion to be possible it is essential that the inclination of the cam be less than $tan^{-1}\ \mu$, where μ is the co-efficient of friction or analytically $dy/d\theta < \mu$.

If a curve in the x, y plane be plotted for which at some point of the period $o - 2\ \pi$, $dy/d\theta > \mu$ then if every elemental value of $d\theta$ be altered in a constant ratio of $k/1$ it is always possible to find k such that $dy/kd\theta < \mu$ and the required condition can always be fulfilled provided $dy/d\theta$ is not $= \pm\ \infty$ at any place. In that case motion is not possible with the cam alone, but this can be overcome, at the discontinuity, by the application of an extraneous force such as gravity, or the action of a spring arranged to produce motion at the discontinuity. A simple

example is that of a cam operating a tilt hammer, which is raised gradually and allowed to fall suddenly under the action of gravity.

For many cases motion of the follower is not parallel to the shaft carrying the cam, but at right angles to it, and the cam surface must then be traced in polar co-ordinates. The condition for movement to be possible is now that the inclination of the cam curve to the radius vector at the point shall be greater than $\frac{\pi}{2} - \alpha$, where $\alpha = tan^{-1} \mu$ or analytically $r\frac{d\theta}{dr} > tan\left(\frac{\pi}{2} - \alpha.\right)$ As in most cases it is easier to fulfil the conditions by drawing the displacement curve with rectangular co-ordinates, it will be convenient to enquire what variation is produced in transferring to polar co-ordinates.

The usual method of transference is to fix upon a minimum radius vector to which corresponds a line in the x, y, plane distant b below the lowest point of the displacement curve. The values of the ordinates cut off between this straight line and the curve of displacements are then taken as polar distances at their appropriate angles, and a smooth curve drawn through their outer ends, and if the curve is such as to satisfy the criterion stated above, the required motion will be obtained.

It will be sufficient for our present purpose if we consider the case of the transformation of a plane cam made up of lines inclined at the maximum angle $\alpha = tau^{-1} \mu$.

If ψ is the corresponding angle which the polar cam makes at any radius r, φ, then

$$rd\ \phi/dr = tan\ \psi.$$

$$\text{Now } \frac{dr}{d\theta} = \frac{dr}{d\phi} = tan\ \alpha.$$

$$\therefore r = tan\ \alpha\ .\ tan\ \psi.$$

$$= \mu\ tan\ \psi.$$

The angle ψ is therefore variable, depending upon the value of r, thus when $r = o$ $\psi = o$ and when $r = \infty$, $\psi = \frac{\pi}{2}$.

This shows that for any possible case (excluding finite discontinuities) a value of x can be found, such that the modified criterion can be satisfied, and hence a polar cam curve can be constructed from the Cartesian curve of displacements.

It is moreover also possible to transform to polar co-ordinates without change of angle, but this method of transformation involves an alteration in the displacement given by the cam.

If we denote a point on the displacement curve by the rectangular co-ordinates x, y, a polar diagram can be drawn, which has, point for

point, the same inclination to the circle struck from the origin as the curve has to the axis of x.

If u, v, be the new rectangular co-ordinates where $u = r\cos\varphi$, $v = r\sin\phi$. Then using the transformation

$$u + \imath v = \varepsilon^{x + \imath y} = \varepsilon^{x} (\cos y + \imath \sin y)$$

and equating real and imaginary parts we obtain

$$r = \varepsilon^{x}, \phi = y$$

This transformation ensures that every straight line $x = x_1$, becomes a circle of radius $r = \varepsilon^{x}$ about the new origin, while every straight $y = \theta$ becomes a radial line passing through the new origin at an angle $\phi = \theta$., or generally lines parallel to the axis of y become transformed into circles round a new origin and lines parallel to the axis of y become radii from the new origin.

Let now the tracing point z in the x, y plane trace a part of the cam curve such that at any point x, y the inclination is β, then the inclination of the transformed curve at the point u, v to the circle is β and hence the required transformation is accomplished.

The magnification is altered, however, as can be seen at once by taking a line passing through the origin of co-ordinates in the plane xy at an angle α.

We have $y = mx$ where $m = \tan\alpha$

Hence $r = \varepsilon^{y/m}$, $\phi = y$

When $y = o$ $\quad r = \varepsilon^{o} = 1$

When $y = \pi$ $\quad r = \varepsilon^{\pi/m}$

The displacement from $o - \pi$ is therefore $\varepsilon^{\pi/m} - 1$ instead of $m\pi$

By altering the scales it is in general possible to make the displacements equal.

Hence the conformal method of representation enables us to transform a curve in the plane of x, y to polar co-ordinates with the angles unchanged.

Application of Fourier's Series to Cams.

It is shown in works on mathematics that any function of x of period 2π which is finite and continuous can be represented by a series of the form

$$f(x) = A_0 + A_1 \cos x + A_2 \cos 2x + A_3 \cos 3x + \quad \ldots\ldots$$
$$+ B_1 \sin x + B_2 \sin 2x + B_2 \sin 3x + \quad \ldots\ldots\ldots$$

and that the values of the constants are given by a series of definite integrals, viz.:

$$A_o = \frac{1}{2\pi}\int_o^{2\pi} f\ (x)\ dx$$

$$A_m = \frac{1}{\pi}\int_o^{2\pi} f\ (x)\ cos\ mx\ dx$$

$$B_m = \frac{1}{\pi}\int_o^{2\pi} f\ (x)\ sin\ mx\ dx.$$

And it can also be shown that no other expansion in a series of sines and cosines can represent the function.

If the function $f(z)$ is not finite everywhere the series may be divergent, but if it is finite the series must be at least semi-convergent, while if discontinuities occur it can be shown that the series will still represent the function, except at the discontinuity, when the sum of the series for this value of x is the mean of the arithmetic values of $f(x)$ at that place. In general, therefore, a curve representing displacements, velocities and acclerations can be resolved into a series of sines or cosines, and since integration of a series renders it more convergent than before, it is possible, starting from a velocity time curve, or an accleration time curve, to obtain a corresponding displacement time curve, from which a cam can be constructed giving predetermined velocities and acclerations.

As a simple example let it be required to determine the form of a cam, which, for one half its stroke, gives a uniformly increasing velocity to the follower, and for the other half a uniformly decreasing velocity. It can easily be shown that a Fourier series representing the given motion is

$$V = \frac{8\,V_o}{\pi^2}\left\{sin\ \omega t - \frac{1}{3^2}\ sin\,3\ \omega t + \ldots + \frac{(-1)^n}{(2n-1)^2}\ sin\ (2n-1)\ \omega t + \right.$$

$$\left. \text{where } \omega = \frac{2\pi}{T}\right\}$$

and this is obviously convergent, since the coefficients are so, and the sine terms can only vary between $\pm$ 1. If now we integrate we obtain

$$S + S_o = -\frac{8\,V_o}{\omega\pi^3}\left\{cos\ \omega t - \frac{1}{3^3} cos\ 3\ \omega t + \frac{(-1)^n}{(2n-1)^3}\ cos\ (2n-1)\ \omega t + \ldots\right\}$$

a still more converging series, and hence the displacement can be determined and the cam drawn.

As another example, let us take an accleration curve in which a uniform positive accleration is impressed upon the follower for one half a revolution, followed by a uniform negative accleration of the same numerical value. For this case

$$\alpha = \frac{4\alpha_o}{\pi}\left\{sin\ \omega t + \tfrac{1}{3}\ in\ 3\ \omega t + \ldots + \frac{1}{2n-1} sin\,(2n-1)\ \omega t + \ldots\right\}$$

A series in which the convergence depends upon the values of the sine terms, since the sum of the coefficients is obviously divergent. On examination the maximum value of the series is found to be

$$\sum_{n=1}^{n=\infty} \frac{(-1)^{n+1}}{n} = \frac{\pi}{4}$$

and the series is semi-convergent and may be integrated.

The integration produces a series of the same form as the previous example and hence the displacement cam can be drawn.

Owing to the simplicity of the instances the resulting displacement curve could be determined more easily by other methods, but if the periodic curve is of more complicated form this would not be the case. For instance, the curve to be analyzed may be made up of arcs of curves of a higher order of single valued functions where it may be difficult to evaluate the definite integrals involved. A graphical process may then be resorted to, as indicated by Professor Clifford.[1]

This may be briefly described as follows: If the periodic curve to be analysed be wrapped round a cylinder so that, without altering the value of the ordinates, it completely encircles the cylinder m times, then it can be shown that the orthogonal projection of this curve on the meridian plane, which passes through the zero point of the curve, will enclose an area which is proportional to the coefficient A_m, and, on a plane at right angles the orthogonal projection will be proportional to B_m. Other methods have been described, such as that described by Langsdorf[2], which merely involves the construction of lines and circles.

In general, therefore, it is possible to determine the displacement curve when the accleration or velocity is prescribed.

It may also be noted that sine and cosine functions are not the only ones into which the original curve can be analysed, for a function of x can be expressed in terms of a series of zonal or cylindrical harmonics in which the co-efficients are expressible in terms of definite integrals, as in Fourier's series.

For ordinary purposes there is no advantage in these forms, as the series becomes extremely complicated, and graphical methods of obtaining the coefficients are more or less undeveloped.

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[1] Collected papers p. 201.

[2] Langsdorf—A graphical method of analysing distorted alternating current waves. Physical Review, 1901, p. 184.

VIII.—*A Laboratory Apparatus for Applying Bending and Torsional Moments Simultaneously.*

By E. G. COKER, M.A., D.Sc.

Assistant Professor of Civil Engineering, McGill University.

(Communicated by Dr. H. T. Bovey, and read May 19, 1903.)

The determination of the behaviour of materials under various kinds of stress forms an essential part of the laboratory training of the engineering student, and various forms of testing machines are used for applying stresses, such as simple tension, compression, bending, shear, and the particular case of shear produced in twisting a bar by an applied torque. Incidentally, cases of compound stress occur, such as in the bending of beams, where it is not usually thought worth while to eliminate the shearing stress from the bending stress on account of its small effect in beams of moderate length in relation to their depth, but in general suitable means for the application of compound stress are rarely found in the laboratory, and in particular the important case of bending combined with twisting is rarely experimented upon, chiefly because the types of machine used for applying bending or torsional moments, are not applicable for applying these stresses simultaneously. The present paper describes an apparatus for applying both kinds of stress in any desired proportion and uniform in amount over the whole length of the specimen and is a modified form of one described in a previous paper.[1]

The principle of the machine is illustrated by Figure 1, in which a rod $A\ B$ of circular section is suspended by rings $C\ D$ from a bar E, and twisting couples are applied by levers $F\ G$ of equal length and loaded to the same degree, whereby a uniform twisting moment is produced on the specimen between the levers. In practice, if the outer end of the lever F is anchored to the ground the effect is the same, and the twisting moment can be applied by a single weight suspended from the lever G.

The ends of the specimen are produced and at suitable distances from each supporting ring loads are applied, so that the bending moment at each ring is the same, and it therefore follows that the bending moment between the supports will be of uniform amount. It it usually preferable to have separate levers for applying the bending moment which can be attached to the ends of the specimen.

[1] Apparatus for measuring strain and applying stress. Trans. Roy. Soc. Edin., 1901.

In this arrangement the application of one stress in no way affects the application of the other, and an apparatus of this kind was used by the author for some time and it worked very satisfactorily. It is, however, too sensitive for ordinary use, as the freedom of motion of a specimen suspended in this way is so great that every application of a load disturbs the equilibrium of the test bar with reference to the supporting beam, and it takes some time for the vibrations to die out; moreover, since the weigh lever must be levelled before a reading can be taken, some means must be provided to effect this after each applica-

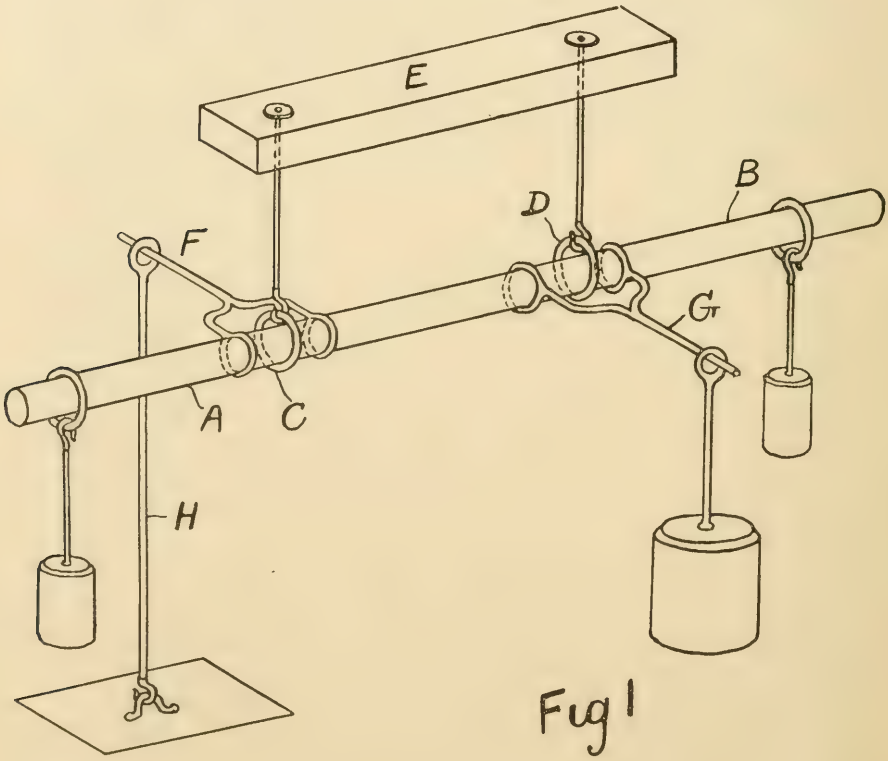

Fig 1

tion of the load, and this was done by a right and left-handed nut forming part of the link *H*. This serves very well for experiments up to the yield point of a bar, but it is not a convenient arrangement if the twist is to be carried further.

In order to overcome these objections a second apparatus was designed in which the lever *F* and the adjusting link *H* were replaced by a worm wheel, secured in a suitable casing and free to rotate about an axis coincident with the centre line of the lever *F*, and this axis was secured in fixed bearings. This arrangement permitted a test to

be carried on to the breaking point, and the fixing of the axis effectually stilled the vibrations, which were produced in the original arrangement.

Figures 2 and 3 show the arrangement used in a small machine, which was built through the kindly aid of Professor Bovey, F.R.S., and which has been in regular use in the testing laboratory of McGill

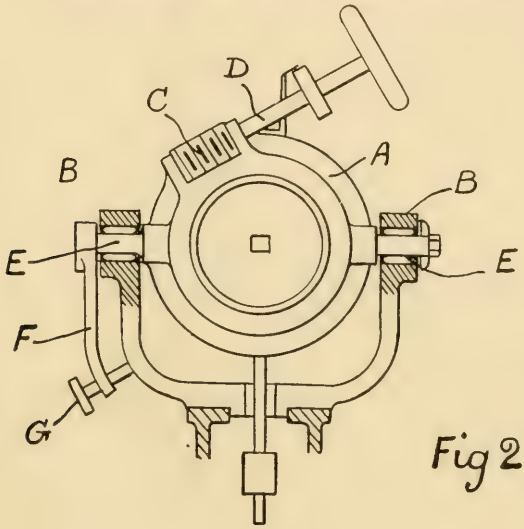

Fig 2

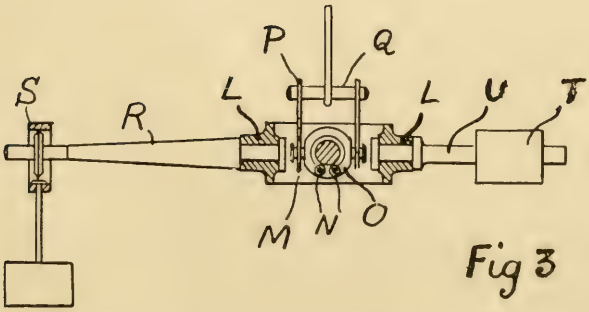

Fig 3

University during the past winter session. Figure 2 is a face view of the torsion head consisting of a casing *A* pivoted in bearings *B* and fitted with a worm wheel operated by a worm *C* on the shaft *D*, provided with a hand wheel. The axles *E*, *E* rest on roller bearings to eliminate friction, and one side carries an arm *F* and locking pin *G* to fix the casing in the vertical plane when torsional moment only is applied. If both kinds of stress are applied, the casing turns with the bar, so that the twisting moment is always applied in a plane at right

angles to the test piece. The specimens are turned from material of square section, and one end is passed through the squared hole in the worm wheel, while the other end is secured in a similar way in the weigh lever shown by figure 3.

This lever consists of a casting L having a central axis M carrying the grip for the specimen, and supported on friction rollers N, mounted in

FIG. 3A.

an encircling ring O. The ring O has pivots perpendicular to the central axis, and thin steel plates P, supported from a spindle Q above encircle these and allow the weigh lever to turn about an axis in the plane of the paper, while motion about the central axis is permitted by the friction rollers. This method of suspension permits bending and torsion moments to be applied simultaneously, and any correction for the friction of the pivots can be readily made, although in practice it is found to be so small as to be negligible in general. The weight of the lever arm R and stirrup S carrying the weights, is balanced by an adjustable weight T upon the arm U; if the specimen is to be twisted in opposite directions alternately a second weigh lever is fitted on the right hand side instead of the balance weight. The weights are suspended,

figure 3, from a ring pivoted on a circular knife edge, screwed on to the weigh lever arm, and secured by clamping nuts on each side.

The general arrangement of the apparatus, with a test bar in position, is shown in perspective in Fig. 3A, where it is seen that the specimen is stressed beyond its yield point by the combined stresses and is bent considerably, the angular distortion due to the twisting moment is not apparent since the lever *R* has been brought back to the horizontal by the worm-wheel gear. In determining the angle of twist of a specimen, use is made of an angle measurer designed by the author,[1] which can be arranged to read accurately on a bent bar. For readings before the yield point is reached some such device is necessary, but afterwards the worm-shaft can be used, as the errors due to the twisting of the enlarged ends can then be neglected. In the present arrangement the worm-wheel has forty-eight teeth, so that one complete turn of the worm shaft corresponds to a twist of $7\frac{1}{2}°$. A graduated disc upon the shaft is divided so that each division corresponds to five minutes of arc, which is sufficiently fine for these relatively rough measurements. To prevent mistakes in reading, the worm-wheel is also divided to check the number of revolutions of the worm shaft, since in testing most metals to destruction, one end must be twisted round several complete turns, and without some counting device, mistakes in measurement are likely to arise. As an example of the results obtained in a case of combined stress, reference may be made to a few experiments on some samples of wrought iron, all of which were cut from the same bar and turned up to a standard size of 0.375 inches. The length of the specimen under test was in all cases, four inches, and the calibration value of the measuring instrument gave one minute of arc as corresponding to 8.68 divisions of the scale. A specimen was first tested by applying a gradually increasing torque without bending, and the bar failed with a torque of about 285 inch pounds, the readings taken are shown in Table I., and the stress-strain curve from these is plotted in Figure 4. Similar specimens to which bending moments of various amounts were applied were then tested, and it was found that an increase in the bending moment lowered the yield point of the material, but as long as the bar remained perfectly elastic, no difference in the angular deflection occurred, beyond what might be reasonably accounted for by unavoidable experimental error and also by the fact that the specimens differed very slightly in diameter.

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[1] Philosophical Magazine, December, 1899.

TABLE I.

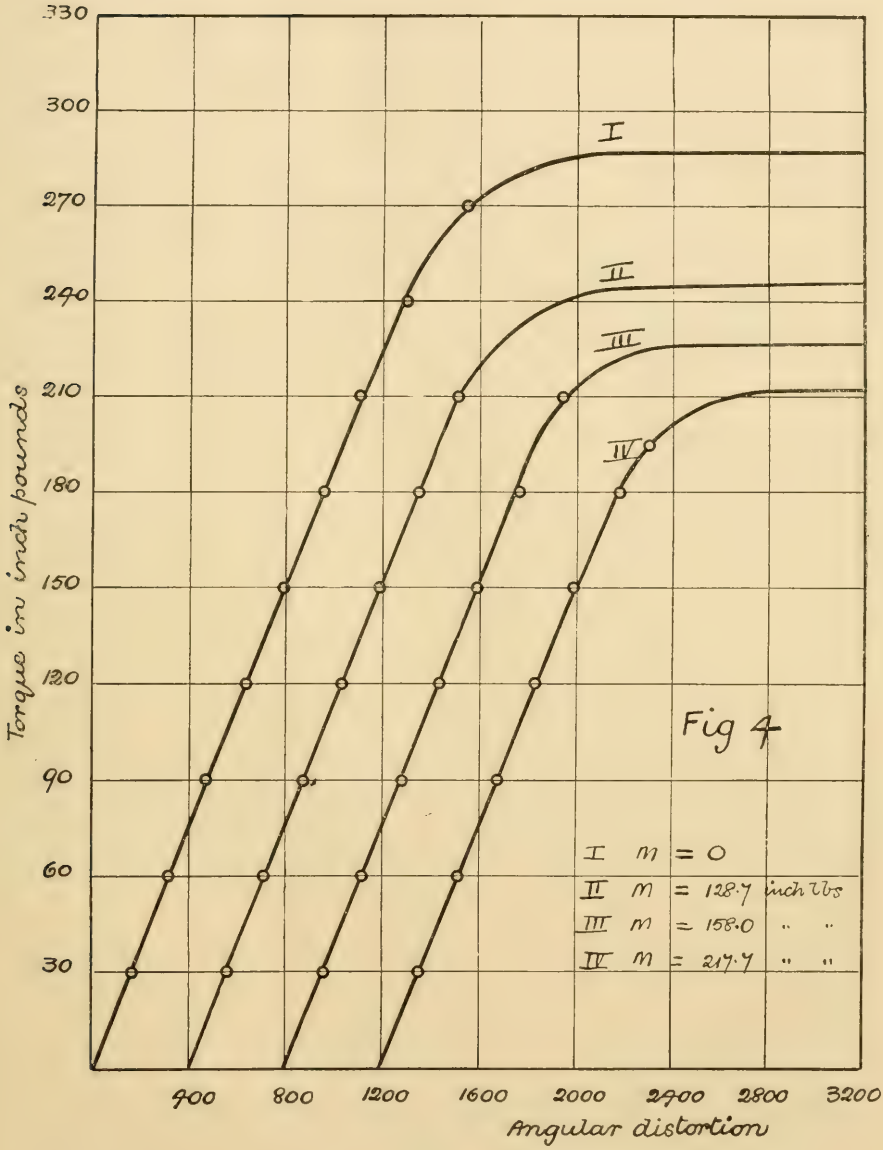
Twisting moment in inch pounds.	Bending Moment (M) in inch pounds							
	$M = 0$		$M = 128{\cdot}7$		$M = 158$		$M = 217.7$	
	Reading	Δ	Reading	Δ	Reading	Δ	Reading	Δ
0	0		0		0		0	
		—161		—159		—160		—159
30	161		159		160		159	
		—160		—158		—160		—160
60	321		317		320		819	
		—161		—157		—161		—161
90	481		479		481		480	
		—157		—158		—161		—157
120	638		632		642		637	
		—159		—158		—161		—165
150	797		791		803		802	
		—161		—157		—160		—175
180	958		948		963		067	
		—167		—162		—197		
210	1125		1110		1160		Went off scale at about 210 inch pounds.	
		—180						
240	1305		Went off scale for a torque of about 250 inch pounds.		Went off each at about 225 inch pounds.			
		—229						
270	1544							
285	Bar failed							

The readings obtained are shown in the accompanying table and are exhibited graphically in Figure 4.

It is interesting to note that McFarlane[1] has shown that the effect of tension is to lower the yield point for shear stress and since bending produces tensional stress, this lowering of the yield point by bending might be expected. Although compression stress is also produced by the effect of bending, yet even if it tends to raise the yield point as Lord Kelvin[2] supposes, it is unlikely to have any influence here. The larger question of the reason for the failure of a material when subjected to stress of various kinds has been the subject of much speculation by mathematicians and physicists and is still debatable. It may be interesting to point out what bearing the various theories have upon the particular case of compound stress considered here, and the differences which arise in applying the theories to obtain formulæ for computing the working strength of a material.

Theories of compound strength.—All cases of stress can be reduced to the general case of three principal stresses in planes at right angles to one another, and if the behaviour of a material under these simultaneous stresses was accurately known, a correct theory could be formulated. In the absence of such information various theories have been proposed from

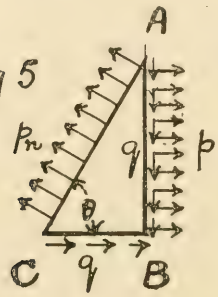
[1] Art Elasticity, Enc. Brit.
[2] *Ibid.*


330
300
270
240
210
180
150
120
90
60
30
Torque in inch pounds
400
800
1200
1600
2000
2400
2800
3200
Angular distortion
I
II
III
IV
Fig 4
I m = 0
II m = 128·7 inch lbs
III m = 158·0 " "
IV m = 217·7 " "

time to time, and the one most generally used by engineers is based upon the assumption, that when one of the principal stresses reaches a limit determined by the material, failure takes place. This theory has been adopted in general by engineers following the lead of Poncelet and Rankine.

Another theory assumes that the material fails when a certain maximum strain has been reached, while a third theory adopts the view that yielding takes place when the shear stress exceeds a certain value. Each of these theories satisfactorily explains the lowering of the yield point in simple tension by a simultaneous bending moment, but they yield different formulæ for purposes of calculation of working strength.

Fig 5



If we consider the equilibrium of a triangular element of a shaft of unit thickness, then the bending moment will produce a normal component of stress p on the face AB, while the torsional moment produces stress of value q on the faces AB, BC.

If on a third plane AC, the stress (p_n) is a normal (principal) stress, then since the element ABC is in equilibrium, we obtain the equations of condition.

$$p_n - p = q \cot \theta \qquad (1)$$

$$p_n = q \tan \theta \qquad (2)$$

and eliminating θ we obtain

$$p_n = p/2 \pm \sqrt{p^2/4 + q^2}$$

where the — sign denotes the lesser principal stress say p^1_n.

According to the maximum stress theory the effect of p^1_n is negligible and failure takes place when $p_n \gtrless f$, where f is the working strength of the material. For a circular shaft writing

$$p = M/\tfrac{1}{4}\pi r^3$$

$$q = T/\tfrac{1}{2}\pi r^3$$

and by analogy

$$p_n = M_\varepsilon/\tfrac{1}{4}\pi r^3$$

we obtain

$$M_\varepsilon = (M + \sqrt{M^2 + T^2}) \mid 2$$

the formula generally used by engineers.

The greater strain theory takes into account the effect of the lesser principal stress, and if e_1 is the maximum strain in the direction of the greater principal stress then when failure takes place we have

$$p_n - p_n^1/m = Ee_1 \gtrless f$$

where m is Poisson's ratio and this criterion results in the equation

$$M_{\varepsilon} = (m-1)\, M/2m + (m+1)\, \sqrt{M^2 + T^2}/2m$$

The third theory adopts the view that failure occurs when the shear stress reaches the limit of resistance of the material. For principal stresses of p_n and p^1_n it is easy to show that the maximum shear stress has the value $p_n - p^1_n$ leading to the equation

$$M_{\varepsilon} = \sqrt{M^2 + T^2}$$

Recent experiments[1] appear to point to this last theory as the true one.

[1] Guest. "On the strength of Ductile Materials under Combined Stress." Phil. Mag., July, 1900.

IX.—*Seismology in Canada.*

By R. F. STUPART.

(Read May 19th, 1903.)

Within the last decade systematic seismological surveys have been begun with central observing stations in several European countries.

In 1897, at the request of the Seismological Investigation Committee of the B.A.A.S., the Meteorological Service undertook the care of two instruments for recording unfelt quakes, one of which was installed at Toronto and paid for by the Dominion Government, and the other in Victoria and was supplied by the B.A.A.S. The instrument used is similar to that supplied to some 38 stations in various parts of the world, but more especially in the colonies of Great Britain. These instruments are distributed as follows:—

(1) Africa ..... Cape Town.
(2) Africa.....Cairo.
(3) Australia.....Melbourne.
(4) " .....Sydney.
(5) " ... . Perth.
(6) Azores.....(2 instruments).
(7) Canada.....Toronto.
(8) Canada.....Victoria, B.C.
(9) Ceylon.....Colombo.
(10) England.....Shide, Isle of Wight
(11) " .....Kew.
(12) " .....Bidston.
(13) Germany.. .....Strassburg.
(14) Hawaii.....Honolulu.
(15) India..... .....Calcutta.
(16) " .....Madras, Kodaikanal
(17) " ..... " Vizagapatam
(18) " .....Bombay.
(19) Java.... .....Batavia.
(20) Japan .....Tokio.
(21) Mauritius.....Royal Alfred Observatory.
(22) Mexico .....Mexico.
(23) New Zealand...Wellington.
(24) " " ...Christ-Church.
(25) Portugal .....Coimbra.
(26) Russia.....Irkutsk.
(27) " .....Tiflis.
(28) " .....Taschkent.
(29) Scotland.....Edinburgh.
(30) " .....Paisley.
(31) S. America.....Cordova (Argentina)
(32) " .....Arequipa.
(33) Spain .....San Fernando.
(34) Syria.....Beyrut.
(35) Trinidad.....
(36) U. S. of AmericaPhiladelphia.
(37) " Baltimore.
(38) Antarctic regions .... .ss. Discovery!

It seems to me that in seismology the realms of investigation by geologist and physicist are very close together.

Earthquakes are probably in most instances caused by the sudden fracturing of the rocky crust of the earth under the influences of bending, and it has been found by investigation, that most of the larger quakes with their accompanying land slips have a sub-oceanic origin in regions where there is a pronounced slope in the ocean bottom. For example, on the borders of the Tuscarora deep off the east coast of Japan. Evidence seems to indicate that volcanic action

at the summits of these slopes often follows a quake, and it is a debatable question whether this is due to the introduction of sea water by infiltration to the interior heat, or whether we must consider the volcanic action started in some other way, and that the water vapour expelled is from water held in the rock formation. Each of these theories has supporters.

Since the installation of the seismograph at Toronto the instrument has recorded 462 quakes, and of this number 58 were large, such as were probably recorded by all similar instruments on the globe.

The monthly average of disturbances is seven, but in September, 1899, thirty-four were recorded. The most pronounced disturbances recorded have had their origin either near Japan, in Alaska or in Mexico or Central America. The largest movement of all was that caused by the Guatemala quake on April 18th, 1902, and which seems to have been the precursor of the West Indian volcanic activity in May.

The largest movement recorded at Victoria was from a Japanese quake which occurred August 9th, 1901, and which caused a large sea wave in the Pacific; also there is evidence that this quake loosened and broke off large pieces of ice from the Alaska glaciers and to it was indirectly due the loss of the S.S. "Islander" in the Lynn Canal on August 16th.

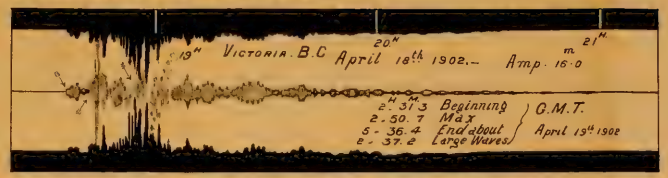
Two Alaska quakes of great severity occurred on the 3rd and 10th of September, 1899, when large vibrations of the booms at Toronto and Victoria were recorded. On September 4th, G. M. T., the initial movement at Victoria began at 0.26,13, and at Toronto 4 minutes later. On September 3rd, about 2.30 p.m., houses in Yakuta Bay, Alaska, were rocked violently. On September 10th, three waves at intervals of five minutes occurred.

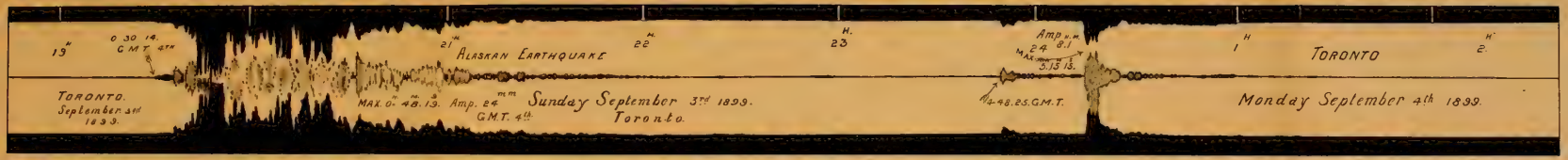
A large earthquake which was recorded January 14th, Toronto, 1h. 54.4m.; Victoria, 1h. 55.6m., becomes interesting when taken in connection with the report of an enormous wave which devastated some of the South Sea Islands on January 13th-14th of this year and which is said to have been accompanied by a seismic disturbance. Did the storm set some vast sub-oceanic strata in motion?

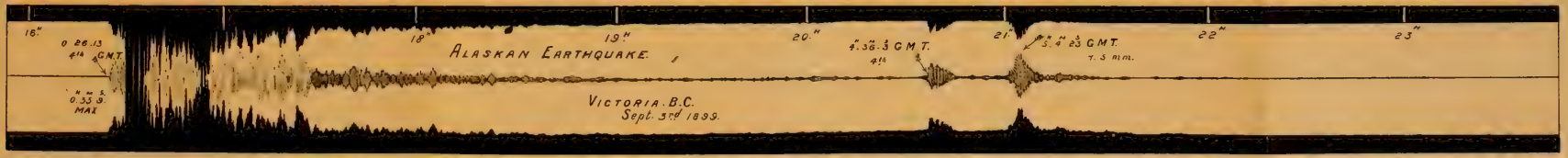
But the work we have so far performed has been simply observational. The greatest care has been taken to have the time scale on our traces very exact and the traces very clear. The measurements are accurately tabulated and forwarded to the B. A. A. S. together with prints of the larger disturbances, these are printed with the results obtained in other countries and the whole are made available to every student of seismology. Briefly, the results show as follows:—That disturbances begin with rapid short period tremors, which after an interval varying with the distance from the origin are followed by large

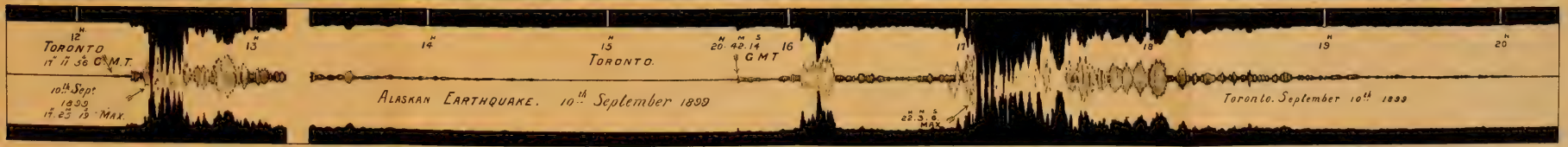
waves, which, if regarded as surface waves have an almost constant rate of 3 K second. Dr. C. G. Knott has arrived at the conclusion that the large waves of earthquakes are transmitted through a comparatively homogeneous medium beneath the crust, which, as they pass is forced to rise and fall like a raft upon an ocean swell. The reality of these earth billows is well illustrated by our magnetic curves from the Agincourt Observatory. See curves.

21.H
22.H
18th April 1902
23. Max. 2.38 about
End 3.24 about
Vibrations very large
24.H
TORONTO.
MEXICAN QUAKE. GUATEMALA.
Friday April 18th 1902.
Sudden Commencement 2.30.3
Beginning of large waves 2.33.3
G.M.T.


19.H
20.H
21.M
VICTORIA. B.C April 18th 1902.—
Amp. 16.0
2.31.3 Beginning
2.50.7 Max
3.36.4 End about
2.37.2 Large Waves
G.M.T.
April 18th 1902


13.M
0 30 14. G.M.T. 4th
21.M
22.H
23.H
ALASKAN EARTHQUAKE
Amp. 24 8.1
MAX. 3.15 13.
1.H
2.H
TORONTO
TORONTO. September 3rd 1899.
MAX. 0.48.13. Amp. 24 mm
G.M.T. 4th
Sunday September 3rd 1899.
Toronto.
4.48.25. G.M.T.
Monday September 4th 1899.


16.M
0 26.13 4th G.M.T.
0.33.9. MAX
18.M
19.M
20.M
ALASKAN EARTHQUAKE.
4.38.3 G.M.T. 4th
21.M
5.4.23 G.M.T.
7.5 mm.
22.M
23.M
VICTORIA. B.C. Sept. 3rd 1899.


12.H
TORONTO 17.17.36 G.M.T.
10th Sept 1899 17.23.19 MAX.
13.M
14.M
15.H
TORONTO.
20.42.14 G.M.T
16
17
18
19.H
20.H
ALASKAN EARTHQUAKE. 10th September 1899
22.3.6 MAX.
Toronto. September 10th 1899

X.—*Numerical values of certain functions involving* e^{-x}.

By W. LASH MILLER, Ph.D., and T. R. ROSEBRUGH, M.A.

(Read May 19, 1903.)

ROY. SOC. CAN. TRANS. (N.S.) IX.

To face page 73 of Section III.

Owing to defective type, some figures in the following decimals are not distinct.

Page 83,	x=.173,	second	integral	.343 044 342
" 87,	" .379,	fifth	"	.986 305 616
" 89,	" .457,	fifth	"	.977 326 592
" 89,	" .486,	fifth	"	.973 302 994
" 89,	" .494,	first	"	.668 065 730
" 91,	" .555,	fourth	"	.892 682 366
" 93,	" .676,	second	"	.391 304 134
" 95,	" .793,	first	"	.256 039 989
" 107,	" 1.23,	.237 636 242		

ERRATA

Page 73 and 74, Eqns. 6, 7, 8, 9, *for* K *read* K q^{1-a}

" 80, footline, *for* $\int \frac{e^{-x}}{x^2} dx$ *read* $\int_x^\infty \frac{e^{-x}}{x^2} dx$

" 80. x=.001, third integral *for* .999 000 500 *read* 0.999 000 500

" 80, x=.001, fourth " " .999 999 500 " 0.999 999 500

" 100, x=1.31, fourth " " .632 284 330 " .623 284 330

" 106, x=.910, *for* .442 334 314 *read* .442 334 312

$$K\,du = \frac{-\,dy}{y^a} \,.\, e^{-qy}\,(1 + ry^2 + \tfrac{1}{2}\,r^2y^4 - sy^3 + ty^4) \qquad (5)$$

Writing x for qy and integrating (with the lower limit $u = 0$, $z = 0$)

$Ku =$

$$-\int e^{-x}\,x^{-a}\,dx - \frac{r}{q^2}\int e^{-x}\,x^{2-a}\,dx + \frac{s}{q^3}\int e^{-x}\,x^{3-a}dx - \frac{t + \frac{1}{2}\,r^2}{q^4}\int e^{-x}x^{4-a}dx \qquad (6)$$

[1] The subject is more fully discussed in a paper which will shortly be published under the title: T. R. Rosebrugh and W. Lash Miller—A convenient integral form of the Equations of Chemical Kinetics.

X.—*Numerical values of certain functions involving e^{-x}.*

By W. LASH MILLER, Ph.D., and T. R. ROSEBRUGH, M.A.

(Read May 19, 1903.)

In dealing with certain problems of Chemical Kinetics,[1] equations of the form

$$k\,du = \frac{dz}{(A-z)^{\alpha}(B-z)^{\beta}(C-z)^{\gamma}\ldots} \tag{1}$$

are commonly met with. The tables published herewith were first computed (to a less number of decimal places) in order to furnish a ready means of integrating them.

In Equation (1), A, B, C, . . are positive constants, arranged in order of magnitude, A being the smallest; α, β, γ, . . are any real quantities; and z may range from 0 to any value less than A.

In Equation (1) making the substitution

$$Ay = A - z, \tag{2}$$

there follows

$$K\,du = \frac{-dy}{y^{\alpha}(1+by)^{\beta}(1+cy)^{\gamma}\ldots} \tag{3}$$

in which

$$b = \frac{A}{B-A},\quad c = \frac{A}{C-A},\ \text{etc.}$$

$$K = k\,A^{\alpha-1}(B-A)^{\beta}(C-A)^{\gamma}\ldots$$

Equation (3) may be written

$$K\,du = \frac{-dy}{y^{\alpha}}\,.\,e^{-qy+ry^2-sy^3+ty^4-\ldots} \tag{4}$$

where $q = \Sigma\beta\,b$, $r = \frac{1}{2}\Sigma\beta\,b^2$, $s = \frac{1}{3}\Sigma\beta\,b^3$, $t = \frac{1}{4}\Sigma\,\beta\,b^4$.

If b, c, . . , are small (y being obviously less than unity), the series in the exponent of e converges rapidly, and Equation (4) may be (approximately) replaced by

$$K\,du = \frac{-dy}{y^{\alpha}}\,.\,e^{-qy}\left(1+ry^2+\tfrac{1}{2}r^2y^4-sy^3+ty^4\right) \tag{5}$$

Writing x for qy and integrating (with the lower limit $u = 0$, $z = 0$)

$$Ku =$$

$$-\int e^{-x}x^{-\alpha}\,dx - \frac{r}{q^2}\int e^{-x}x^{2-\alpha}\,dx + \frac{s}{q^3}\int e^{-x}x^{3-\alpha}dx - \frac{t+\frac{1}{2}r^2}{q^4}\int e^{-x}x^{4-\alpha}dx \tag{6}$$

[1] The subject is more fully discussed in a paper which will shortly be published under the title: T. R. Rosebrugh and W. Lash Miller—A convenient integral form of the Equations of Chemical Kinetics.

The cases where $\alpha = 0$, $\alpha = 1$, and $\alpha = 2$, are of particular importance in the class of problems already referred to. Introducing these values Equation (6) becomes[1]

$$\alpha = 0,\ Ku = -\int e^{-x} dx - \frac{r}{q^2}\int e^{-x}\, x^2\, dx \tag{7}$$

$$\alpha = 1,\ Ku = -\int \frac{e^{-x}}{x}\, dx - \frac{r}{q^2}\int e^{-x}\, x\, dx + \frac{s}{q^3}\int e^{-x}\, x^2\, dx \tag{8}$$

$$\alpha = 2,\ Ku = -\int \frac{e^{-x}}{x^2}\, dx - \frac{r}{q^2}\int e^{-x}\, dx + \frac{s}{q^3}\int e^{-x}\, x\, dx$$
$$- \frac{t + \frac{1}{3} r^2}{q^4}\int e^{-x}\, x^2\, dx \tag{9}$$

and by means of tables of these integrals computations can be carried out with much less labour than if the method of integration by partial fractions —assuming its applicability—were employed. This is particularly the case when the factors in Equation (1) are numerous, or the exponents large.

The most general form of Equation (1) may be written

$$K\, du = \frac{-\, dy}{y^{\alpha}\,(1 + g_1 y + h_1 y^2 + m_1 y^3 + \ldots)^{\beta}\,(1 + g_2 y + h_2 y^2 + m_2 y^3 + \ldots)^{\gamma}\ \ldots}$$

rom which the following values of q, r, s . . . . may be found

$$q = \Sigma\beta g\,;\ r = \tfrac{1}{2}\,\Sigma\beta g^2 - \Sigma\beta h\,;\ s = \tfrac{1}{3}\,\Sigma\beta g^3 - \Sigma\beta g h + \Sigma\beta m$$

As β, γ . . . may be negative, this form includes the cases where factors are contained in the numerator as well as in the denominator. When the indices are fractional, the method here described affords a means of integration where others fail; it is, however, as already stated,

[1] If e^{x} be substituted for e^{-x}, the sign of the variable limit must be reversed, and that of the integral may be affected. Thus:

$$\int_{-x}^{-\infty} \frac{e^{x}}{x^2} dx = -\int_{x}^{\infty} \frac{e^{-x}}{x^2} dx$$

$$\int_{-x}^{-\infty} \frac{e^{x}}{x} dx = \int_{x}^{\infty} \frac{e^{-x}}{x} dx$$

$$\int_{-x}^{-\infty} e^{x}\, dx = -\int_{x}^{\infty} e^{-x}\, dx$$

$$\int_{-x}^{-\infty} e^{x}\, x\, dx = \int_{x}^{\infty} e^{-x} x\, dx$$

$$\int_{-x}^{-\infty} e^{x}\, x^2 dx = -\int_{x}^{\infty} e^{-x} x^2 dx$$

subject to the limitation that the series in the exponent of e must converge rapidly.

Of the integrals

$$\int \frac{e^{-x}}{x^2}\,dx, \int \frac{e^{-x}}{x}\,dx, \int e^{-x}\,dx, \int xe^{-x}\,dx, \int x^2e^{-x}\,dx,$$

The first may be reduced to the second, the so-called "Exponential Integral" $Ei\,(-x)$, and the fourth and fifth to the third, or Exponential Function.

The Exponential Function has been tabulated by Mr. F. W. Newman,[1] from $x = 0$ to $x = 37$, at intervals of .1 to eighteen decimal places (sixteen exact), from $x = 0$ to $x = 15.349$ at intervals of .001 to twelve decimal places, from $x = 15.350$ to $x = 17.298$ at intervals of .002, and from $x = 17.300$ to $x = 27.635$ at intervals of .005 to fourteen decimal places.

Tables of the same function have been prepared by Mr. J. W. L. Glaisher[2] from $x = 0.001$ to $x = 1.000$ at intervals of .001, from $x = 0.01$ to $x = 2.00$ at intervals of .01, from $x = 0.1$ to $x = 10.0$ at intervals of .1, and from $x = 1$ to $x = 500$ at intervals of unity. In every case the first nine significant figures are given.

The Exponential Integral has been tabulated by Mr. J. W. L. Glaisher[3] from $x = 0$ to $x = 1.00$ at intervals of .01 to eighteen places, from 1.0 to 5.0 at intervals of .1 to eleven places, and from 6.0 to 15.0 at intervals of unity to eleven places.

For the problems with which we were concerned, these intervals were too wide, we have therefore constructed a table of the descending Exponential Integral from $x = 0$ to $x = 1.000$ at intervals of .001, and from $x = 1.00$ to $x = 2.00$ at intervals of .01, to nine decimal places.

The other three integrals have not hitherto been tabulated, so far as we are aware.

Values of $\int_x^\infty e^{-x}\,dx$, *from* $x = 0$ *to* $x = 1.000$ *at intervals of* .001 (*Table I*), *and from* $x = 1.00$ *to* $x = 2.00$ *at intervals of* .01 (*Table II*). These are Newman's values of e^{-x} to the nearest digit in the ninth decimal place.

In his "Tables of the Exponential Function" Glaisher says: "The last figure is therefore in general correctly given to the nearest unit, but it may be in error by a unit where the tenth figure is a 4, 5 or 6." On comparing Glaisher's table with that of Newman five cases were found

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[1] Cambridge Phil. Trans., XIII, 145 (1883).
[2] *Ibid*, XIII, 243.
[3] Phil. Trans., CLX, 367 (1870).

between $x = 0$ and $x = 2$ (viz., $x = 0.820$, 1.28, 1.75, 1.93, 1.99) in which there was a discrepancy of one unit in the ninth decimal place, and the tenth digit was 4 or 5.

There are two others in which the tenth figures are 2 and 8 respectively, viz.:

x	Newman	Glaisher
1.55	0.212 247 973 827	0.212 247 973
1.80	0.165 298 888 221	0.165 298 889

In both cases Newman's result was found to be exactly the square of his number for half the value of x.

Values of $\frac{e^{-x}}{x}$, *from* $x=0.100$ *to* $x=1.000$ *at intervals of* .001 (*Table III*), *and from* $x = 1.00$ *to* $x = 2.00$ *at intervals of* .01 (*Table IV*). These were obtained by division from Newman's values of e^{-x}.

For use in calculating the Exponential Integral the first, second and following differences of the first seven decimal places were taken until they were small enough to be followed readily, these served also to detect errors in the first six places. At the beginning of the table, $x = 0.100$ to $x = 0.210$, the differencing was extended to the whole nine decimal places.

The last six figures of $\frac{e^{-x}}{x}$ were then multiplied by the corresponding value of x and the product compared with Newman's value of e^{-x}, thus eliminating errors in the last three places. This verification was performed on the type-written sheets ready for the printer.

This table was then used in computing $\int_x^\infty \frac{e^{-x}}{x}\,dx$ and $\int_x^\infty \frac{e^{-x}}{x^2}\,dx$.

Values of $\frac{e^{-x}-1}{x}$ *from* $x = 0$ *to* $x = 0.100$ *at intervals of* .001 (*Table III*). By division, from Newman's values of e^{-x}; checked by taking the first and second differences on the type-written sheets.

These numbers were used in computing

$$\int_x^\infty \frac{e^{-x}}{x}\,dx + \log_e x, \text{ and } \int_x^\infty \frac{e^{-x}}{x^2}\,dx - \frac{1}{x} - \log_e x$$

Values of $\int_x^\infty \frac{e^{-x}}{x}\,dx$ *from* $x = 0.100$ *to* $x = 1.000$ *at intervals of* .001 (*Table I*), *and from* $x = 1.00$ *to* $x = 2.00$ *at intervals of* .01 (*Table II*). It was found impossible to obtain these from Glaisher's table by interpolation. The table was consequently built up from the values of e^{-x}/x by means of the relation

$$\Delta \,.\, Ei\,(-x) = 0.001\,(1 + \tfrac{1}{2}\Delta - \tfrac{1}{12}\Delta^2 + \tfrac{1}{24}\Delta^3 - \tfrac{19}{720}\Delta^4)e^{-x}/x$$

which may be deduced by Taylor's theorem, treating intervals of 0.001 as units.[1]

The computation was carried out with ten places of decimals, and every tenth value was checked by Glaisher's results, and found to agree within a few units in the last place; the tenth place was then rejected. Incidentally the agreement furnishes evidence of the accuracy of Glaisher's Table, at least as far as the ninth decimal place, and of our Table of e^{-x}/x as far as the seventh.

Following Glaisher,[2] the integration constant

$$\gamma = 0.577\ 215\ 665$$

was adopted, whence $Ei\,(-\infty) = 0$.

Values of $\int_x^\infty \frac{e^{-x}}{x}\,dx + \log_e x$ *from* $x = 0$ *to* $x = 0.100$ *at intervals of* .001 (*Table I*). As for $x = 0$, $\int_x^\infty \frac{e^{-x}}{x}\,dx$ becomes infinite, interpolation for low values of x would be impossible. By adding $\log_e x$ however, the infinity is removed and this difficulty is avoided, $\int_x^\infty \frac{e^{-x}}{x}\,dx + \log_e x$ for $x = 0$ having the value $-\gamma$. By subtracting the logarithm, $\int_x^\infty \frac{e^{-x}}{x}\,dx$ may be obtained.

The values in the Table were computed in the same manner as those of $\int_x^\infty \frac{e^{-x}}{x}\,dx$, using $\frac{e^{-x}-1}{x}$ in place of $\frac{e^{-x}}{x}$, and every tenth was checked against Glaisher's value for $\int_\infty^x \frac{e^{-x}}{x}\,dx$. The numbers so obtained are *negative*.

For example :

for $x = 0{\cdot}050$, $\int_x^\infty \frac{e^{-x}}{x}\,dx + \log_e x = -\,0.527\ 833\ 785$

hence
$$\begin{aligned}\int_x^\infty \frac{e^{-x}}{x}\,dx &= -\,0.527\ 833\ 785 - \log_e 0.050\\ &= -\,0.527\ 833\ 785 + 2.995\ 732\ 274\\ &= \,2.467\ 898\ 489\end{aligned}$$

Values of $\int_x^\infty \frac{e^{-x}}{x^2}\,dx$ *from* $x = 0.100$ *to* $x = 1.000$ *at intervals of* .001

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[1] The coefficients are those of the powers of x in the expansion of $\frac{x}{\log_e(1+x)}$ See: Boole, Finite Differences.

[2] In Glaisher's Table the limits are the inverse of ours, hence the minus sign prefixed to his numbers.

(Table I), and from $x = 1.00$ *to* $x = 2.00$ *at intervals of* .01 *(Table II).* Obtained by subtraction

$$\int_x^\infty \frac{e^{-x}}{x^2}\,dx = \frac{e^{-x}}{x} - \int_x^\infty \frac{e^{-x}}{x}\,dx$$

and checked by addition.

Values of $\int_x^\infty \frac{e^{-x}}{x^2}\,dx - \frac{1}{x} - \log_e x$ *from* $x = 0$ *to* $x = 0.100$ *at intervals of* .001 *(Table I).* These numbers supplement the values of $\int_x^\infty \frac{e^{-x}}{x^2}\,dx$ in the same way that $\int_x^\infty \frac{e^{-x}}{x}\,dx + \log_e x$ supplements those of $\int_x^\infty \frac{e^{-x}}{x}\,dx$. They were obtained by subtraction,

$$\int_x^\infty \frac{e^{-x}}{x^2}\,dx - \frac{1}{x} - \log_e x = \frac{e^{-x}-1}{x} - \left(\int_x^\infty \frac{e^{-x}}{x}dx + \log_e x\right)$$

and checked by addition. As in the case of $\int_x^\infty \frac{e^{-x}}{x}\,dx + \log_e x$ the numbers tabulated are negative in sign. For example: for $x = 0.001$

$$\int_x^\infty \frac{e^{-x}}{x^2}\,dx - \frac{1}{x} - \log_e x = -\,0.423\ 283\ 252$$

hence

$$\int_x^\infty \frac{e^{-x}}{x^2}\,dx = -\,0.423\ 283\ 252 + 1000 - 6.907\ 755\ 279$$
$$= 992.668\ 961\ 469$$

Values of $\int_x^\infty xe^{-x}\,dx$ *from* $x = 0$ *to* $x = 1.000$ *at intervals of* .001 *(Table I), and from* $x = 1.00$ *to* $x = 2.00$ *at intervals of* .01 *(Table II).* Prepared from Newman's values of e^{-x} by multiplication, according to the formula

$$\int_x^\infty xe^{-x}dx = (1 + x)\,e^{-x}$$

and checked by taking first and second differences from $x = 0$ to $x = 1$, and first, second, and third differences from $x = 1$ to $x = 2$, on the typewritten sheets.

Values of $\int_x^\infty x^2e^{-x}\,dx$ *from* $x=0$ *to* $x = 1.000$ *at intervals of* .001 *(Table I), and from* $x = 1.00$ *to* $x = 2.00$ *at intervals of* .01 *(Table II)* From Newman's Table of e^{-x} by multiplication,

$$\int_x^\infty x^2e^{-x}\,dx = \left\{1 + (1 + x)^2\right\} e^{-x}$$

checked by first and second differences between $x = 0$ and $x = 1.000$ and by first, second, and third differences from $x = 1.00$ to $x = 2.00$ on the type-written sheets.

Our thanks are due to Mr. R. F. Stupart, Superintendent of the Meteorological Service, for the use of a 8–16 place arithmometer, which together with a 6–12 place arithmometer and a 9 place comptometer from the School of Practical Science, were of great assistance in computing the tables.

TABLES.

TABLE I. $x = 0$ to $x = 0.100$ at intervals of .001, numerical values of

$$\int_x^\infty \frac{e^{-x}}{x^2}\,dx - \frac{1}{x} - \log_e x, \int_x^\infty \frac{e^{-x}}{x}\,dx + \log_e x, \int_x^\infty e^{-x}\,dx, \int_x^\infty xe^{-x}\,dx, \text{ and}$$

$$\int_x^\infty x^2e^{-x}\,dx.$$

$x = 0.100$ to $x = 1.000$ at intervals of .001, numerical values of

$$\int_x^\infty \frac{e^{-x}}{x^2}dx, \int_x^\infty \frac{e^{-x}}{x}\,dx, \int_x^\infty e^{-x}\,dx. \int_x^\infty xe^{-x}\,dx, \text{ and } \int_x^\infty x^2e^{-x}\,dx.$$

TABLE II. $x = 1.00$ to $x = 2.00$ at intervals of .01, numerical values of

$$\int_x^\infty \frac{e^{-x}}{x^2}\,dx, \int_x^\infty \frac{e^{-x}}{x}\,dx, \int_x^\infty e^{-x}\,dx, \int_x^\infty xe^{-x}\,dx, \text{ and } \int_x^\infty x^2e^{-x}\,dx.$$

TABLE III. $x = 0$ to $x = 0.100$ at intervals of .001, numerical values of $\frac{e^{-x} - 1}{x}$.

$x = 0.100$ to $x = 1.000$ at intervals of .001, numerical values of $\frac{e^{-x}}{x}$.

TABLE IV. $x = 1.00$ to $x = 2.00$ at intervals of .01, numerical values of $\frac{e^{-x}}{x}$.

TABLE 1.

x	$-A$	$-B$	$\int_x^\infty e^{-x}\,dx$	$\int_x^\infty xe^{-x}\,dx$	$\int_x^\infty x^2e^{-x}\,dx$
.000	0.422 784 335	0.577 215 665	1.000 000 000	1.000 000 000	2.000 000 000
.001	.423 283 252	.576 216 915	.999 000 500	.999 999 500	.000 000 000
.002	.423 784 002	.575 216 665	.998 001 999	.999 998 003	1.999 999 997
.003	.424 283 585	.574 217 914	.997 004 496	.999 995 509	.999 999 991
.004	.424 783 002	.573 219 662	.996 007 989	.999 992 021	.999 999 979
.005	.425 282 253	.572 221 908	.995 012 479	.999 987 542	.999 999 958
.006	.425 781 338	.571 224 653	.994 017 964	.999 982 071	.999 999 928
.007	.426 280 257	.570 227 896	.993 024 443	.999 975 613	.999 999 886
.008	.426 779 008	.569 231 637	.992 031 915	.999 968 170	.999 999 830
.009	.427 277 595	.568 235 875	.991 040 379	.999 959 742	.999 999 759
010	.427 776 015	.567 240 610	.990 049 834	.999 950 332	.999 999 669
.011	.428 274 269	.566 245 842	.989 060 279	.999 939 942	.999 999 560
.012	.428 772 358	.565 251 570	.988 071 713	.999 928 573	.999 999 429
.013	.429 270 282	.564 257 794	.987 084 135	.999 916 229	.999 999 275
.014	.429 768 040	.563 264 513	.986 097 544	.999 902 910	.999 999 095
.015	.430 265 632	.562 271 728	.985 111 940	.999 888 619	.999 998 888
.016	.430 763 059	.561 279 438	.984 127 320	.999 873 357	.999 998 651
.017	.431 260 320	.560 287 643	.983 143 685	.999 857 127	.999 998 383
.018	.431 757 416	.559 296 342	.982 161 032	.999 839 931	.999 998 082
.019	.432 254 347	.558 305 535	.981 179 362	.999 821 770	.999 997 746
.020	.432 751 113	.557 315 222	.980 198 673	.999 802 647	.999 997 373
.021	.433 247 713	.556 325 403	.979 218 965	.999 782 563	.999 996 961
.022	.433 744 149	.555 336 076	.978 240 235	.999 761 520	.999 996 509
.023	.434 240 420	.554 347 242	.977 262 484	.999 739 521	.999 996 014
.024	.434 736 526	553 358 901	976 285 710	.999 716 567	.999 995 474
.025	.435 232 468	.552 371 051	.975 309 912	.999 692 660	.999 994 888
.026	.435 728 245	.551 383 693	.974 335 090	.999 667 802	.999 994 254
.027	.436 223 857	.550 396 827	.973 361 242	.999 641 994	.999 993 570
.028	.436 719 305	.549 410 452	.972 388 367	.999 615 241	.999 992 835
.029	.437 214 589	.548 424 567	.971 416 464	.999 587 541	.999 992 045
.030	.437 709 709	.547 439 173	.970 445 534	.999 558 900	.999 991 200
.031	.438 204 663	.546 454 270	.969 475 573	.999 529 316	.999 990 299
.032	.438 699 455	.545 469 855	.968 506 582	.999 498 793	.999 989 338
.033	.439 194 081	.544 485 931	.967 538 560	.999 467 332	.999 988 314
.034	.439 688 545	.543 502 495	.966 571 505	.999 434 936	.999 987 228
.035	.440 182 844	.542 519 549	.965 605 416	.999 401 606	.999 986 078
.036	.440 676 980	.541 537 090	.964 640 293	.999 367 344	.999 984 862
.037	.441 170 952	.540 555 120	.963 676 135	.999 332 152	.999 983 577
.038	.441 664 760	.539 573 638	.962 712 941	.999 296 032	.999 982 223
.039	.442 158 405	.538 592 643	.961 750 709	.999 258 987	.999 980 796
.040	.442 651 885	.537 612 136	.960 789 439	.999 221 017	.999 979 297
.041	.443 145 203	.536 632 115	.959 829 130	.999 182 124	.999 977 721
.042	.443 638 358	.535 652 581	.958 869 781	.999 142 311	.999 976 069
.043	.444 131 349	.534 673 533	.957 911 390	.999 101 580	.999 974 338
.044	.444 624 177	.533 694 971	.956 953 957	.999 059 932	.999 972 526
.045	.445 116 842	.532 716 895	.955 997 482	.999 017 368	.999 970 632
.046	.445 609 344	.531 739 304	.955 041 962	.998 973 892	.999 968 654
.047	.446 101 684	.530 762 197	.954 087 398	.998 929 505	.999 966 590
.048	.446 593 860	.529 785 576	.953 133 787	.998 884 209	.999 964 438
.049	.447 085 872	.528 809 438	.952 181 130	.998 838 005	.999 962 197
.050	.447 577 725	.527 833 785	.951 229 425	.998 790 896	.999 959 865

$$A = \int_x \frac{e^{-x}}{x^2}\,dx - \frac{1}{x} - \log_e x; \quad B = \int_x^\infty \frac{e^{-x}}{x}\,dx + \log_e x$$

TABLE 1.

x	$-A$	$-B$	$\int_x^\infty e^{-x}\,dx$	$\int_x^\infty xe^{-x}\,dx$	$\int_x^\infty x^2e^{-x}\,dx$
.050	0.447 577 725	0.527 833 785	0.951 229 425	0.998 790 896	1.999 959 865
.051	.448 069 413	.526 858 616	.950 278 671	.998 742 883	.999 957 440
.052	.448 560 929	.525 883 939	.949 328 867	.998 693 968	.999 954 921
.053	.449 052 303	.524 909 726	.948 380 012	.998 644 153	.999 952 306
.054	.449 543 504	.523 936 005	.947 432 107	.998 593 440	.999 949 593
.055	450 034 544	.522 962 766	.946 485 148	.998 541 831	.999 946 780
.056	.450 525 421	.521 990 010	.945 539 136	.998 489 328	.999 943 866
.057	.451 016 136	.521 017 735	.944 594 069	.998 435 930	.999 940 849
.058	.451 506 688	.520 045 942	.943 649 947	.998 381 644	.999 937 727
.059	.451 997 079	.519 074 630	.942 706 769	.998 326 469	.999 934 499
.060	.452 487 308	.518 103 799	.941 764 534	.998 270 406	.999 931 164
.061	.452 977 375	.517 133 448	.940 823 240	.998 213 457	.999 927 718
.062	.453 467 281	.516 163 577	.939 882 887	.998 155 626	.999 924 161
.063	.453 957 025	.515 194 186	.938 943 474	.998 096 912	.999 920 492
.064	.454 446 608	.514 225 274	.938 005 000	.998 037 319	.999 916 707
.065	.454 936 029	.513 256 842	.937 067 463	.997 976 848	.999 912 807
.066	.455 425 288	.512 288 889	.936 130 864	.997 915 501	.999 908 789
.067	.455 914 387	.511 321 414	.935 195 201	.997 853 280	.999 904 651
.068	.456 403 325	.510 354 417	.934 260 474	.997 790 186	.999 900 392
.069	.456 892 101	.509 387 898	.933 326 680	.997 726 220	.999 896 010
.070	.457 380 716	.508 421 856	.932 393 820	.997 661 387	.999 891 504
.071	.457 869 170	.507 456 293	.931 461 892	.997 595 686	.999 886 872
072	.458 357 463	.506 491 206	.930 530 896	.997 529 120	.999 882 113
.073	.458 845 596	.505 526 595	.929 600 830	.997 461 691	.999 877 224
.074	.459 333 568	.504 562 461	.928 671 694	997 393 398	.999 872 205
.075	.459 821 379	.503 598 803	.927 743 486	.997 324 248	.999 867 053
.076	.460 309 030	.502 635 621	.926 816 207	.997 254 238	.999 861 767
.077	.460 796 520	.501 672 914	.925 889 854	.997 183 372	.999 856 346
.078	.461 283 849	.500 710 682	.924 964 427	.997 111 652	.999.850 787
.079	.461 771 019	.499 748 925	.924 039 924	.997 039 078	.999 845 090
.080	.462 258 028	.498 787 642	.923 116 346	.996 965 654	.999 839 253
.081	462 744 878	.497 826 833	.922 193 691	.996 891 380	.999 833 274
.082	.463 231 567	.496 866 498	.921 271 959	.996 816 259	.999 827 151
.083	.463 718 095	.495 906 637	.920 351 147	.996 740 292	.999 820 884
.084	.464 204 464	.494 947 249	.919 431 256	.996 663 482	.999 814 470
.085	.464 690 674	.493 988 333	.918 512 284	.996 585 828	.999 807 908
.086	.465 176 723	.493 029 891	.917 594 231	.996 507 335	.999 801 197
.087	.465 662 613	.492 071 920	.916 677 096	.996 428 003	.999 794 335
.088	.466 148 344	.491 114 421	.915 760 877	.996 347 834	.999 787 320
.089	.466 633 914	.490 157 394	.914 845 574	.996 266 829	.999 780 151
.090	.467 119 325	.489 200 839	.913 931 185	.996 184 992	.999 772 826
.091	.467 604 577	.488 244 754	.913 017 711	.996 102 323	.999 765 345
.092	.468 089 669	.487 289 140	.912 105 150	.996 018 823	.999 757 705
.093	.468 574 603	.486 333 996	.911 193 500	.995 934 496	.999 749 904
.094	.469 059 377	.485 379 323	.910 282 762	.995 849 342	.999 741 942
.095	.469 543 992	.484 425 119	.909 372 934	.995 763 363	.999 733 817
.096	.470 028 449	.483 471 384	.908 464 016	.995 676 562	.999 725 528
.097	.470 512 746	.482 518 119	.907 556 006	.995 588 939	.999 717 072
.098	.470 996 884	.481 565 323	.906 648 904	.995 500 496	.999 708 449
.099	.471 480 864	.480 612 994	.905 742 708	.995 411 236	.999 699 657
.100	.471 964 685	.479 661 135	.904 837 418	.995 321 160	.999 690 694

$$A = \int_x^\infty \frac{e^{-x}}{x^2}\,dx - \frac{1}{x} - \log_e x\,; \quad B = \int_x^\infty \frac{e^{-x}}{x}\,dx + \log_e x$$

TABLE I

x	$\int_x^\infty \frac{e^{-x}}{x^2}dx$	$\int_x^\infty \frac{e^{-x}}{x}dx$	$\int_x^\infty e^{-x}\,dx$	$\int_x^\infty xe^{-x}\,dx$	$\int_x^\infty x^2e^{-x}\,dx$
.100	7.225 450 222	1.822 923 958	0.904 837 418	0.995 321 160	1.999 690 694
.101	.135 906 990	.813 925 019	.903 933 033	.995 230 269	.999 681 559
.102	.048 207 252	.805 023 647	.903 029 552	.995 138 566	.999 672 251
.103	6.962 296 377	.796 217 930	.902 126 973	.995 046 052	.999 662 769
.104	.878 121 851	.787 506 009	.901 225 297	.994 952 728	.999 653 110
.105	.795 633 182	.778 886 081	.900 324 523	.994 858 597	.999 643 273
.106	.714 781 795	.770 356 394	.899 424 648	.994 763 661	.999 633 257
.107	.635 520 951	.761 915 245	.898 525 673	.994 667 919	.999 623 060
.108	.557 805 656	.753 560 978	.897 627 596	.994 571 376	.999 612 682
.109	.481 592 581	.745 291 983	.896 730 417	.994 474 033	.999 602 120
.110	.406 839 991	.737 106 694	.895 834 135	.994 375 890	.999 591 373
.111	.333 507 663	.729 003 589	.894 938 749	.994 276 950	.999 580 440
.112	.261 556 829	.720 981 184	.894 044 257	.994 177 214	.999 569 320
.113	.190 950 104	.713 038 038	.893 150 660	.994 076 685	.999 558 010
.114	.121 651 428	.705 172 746	.892 257 956	.993 975 362	.999 546 510
.115	.053 626 007	.697 383 940	.891 366 144	.993 873 250	.999 534 818
.116	5.986 840 258	.689 670 288	.890 475 223	.993 770 349	.999 522 933
.117	.921 261 757	.682 030 492	.889 585 193	.993 666 660	.999 510 853
118	.856 859 193	.674 463 287	.888 696 053	.993 562 187	.999 498 577
.119	.793 602 313	.666 967 441	.887 807 801	.993 456 929	.999 486 103
.120	.731 461 887	.659 541 752	.886 920 437	.993 350 889	.999 473 433
.121	.670 409 659	.652 185 048	.886 033 960	.993 244 069	.999 460 561
.122	.610 418 310	.644 896 186	.885 148 369	.993 136 469	.999 447 487
.123	.551 461 416	.637 674 052	.884 263 663	.993 028 093	.999 434 211
.124	.493 513 418	.630 517 557	.883 379 841	.992 918 941	.999 420 731
.125	.436 549 580	.623 425 641	.882 496 903	.992 809 015	.999 407 045
126	.380 545 962	.616 397 266	.881 614 847	.992 698 317	.999 393 152
.127	.325 479 387	.609 431 421	.880 733 673	.992 586 849	.999 379 051
.128	.271 327 406	.602 527 119	.879 853 379	.992 474 612	.999 364 741
.129	.218 068 277	.595 683 394	.878 973 966	.992 361 606	.999 350 220
.130	.165 680 933	.588 899 305	.878 095 431	.992 247 837	.999 335 487
.131	.114 144 958	.582 173 930	.877 217 774	.992 133 303	.999 320 540
.132	.063 440 561	.575 506 371	.876 340 995	.992 018 006	.999 305 378
.133	.013 548 555	.568 895 747	.875 465 092	.991 901 949	.999 290 001
.134	4.964 450 328	.562 341 199	.874 590 065	.991 785 133	.999 274 406
.135	.916 127 829	.555 841 887	.873 715 912	.991 667 560	.999 258 592
.136	.868 563 544	.549 396 989	.872 842 632	.991 549 231	.999 242 558
.137	.821 740 475	.543 005 701	.871 970 226	.991 430 147	.999 226 303
.138	.775 642 123	.536 667 237	.871 098 692	.991 310 311	.999 209 826
.139	.730 252 470	.530 380 828	.870 228 028	.991 189 724	.999 193 125
.140	.685 555 959	.524 145 722	.869 358 235	.991 068 388	.999 176 198
.141	.641 537 483	.517 961 182	.868 489 312	.990 946 305	.999 159 044
.142	.598 182 362	.511 826 487	.867 621 256	.990 823 475	.999 141 665
.143	.555 476 333	.505 740 932	.866 754 069	.990 699 901	.999 124 055
.144	.513 405 537	.499 703 825	.865 887 748	.990 575 584	.999 106 216
.145	.471 956 497	.493 714 490	.865 022 293	.990 450 525	.999 088 145
.146	.431 116 114	.487 772 264	.864 157 703	.990 324 728	.999 069 841
.147	.390 871 647	.481 876 499	.863 293 977	.990 198 192	.999 051 304
.148	.351 210 705	.476 026 558	.862 431 115	.990 070 920	.999 032 531
.149	.312 121 234	.470 221 819	.861 569 115	.989 942 913	.999 013 522
.150	.273 591 506	.464 461 670	.860 707 976	.989 814 173	.998 994 275

TABLE I

x	$\int_x^\infty \frac{e^{-x}}{x^2}dx$	$\int_x^\infty \frac{e^{-x}}{x}dx$	$\int_x^\infty e^{-x}\,dx$	$\int_x^\infty xe^{-x}\,dx$	$\int_x^\infty x^2e^{-x}\,dx$
.150	4.273 591 506	1.464 461 670	0.860 707 976	0.989 814 173	1.998 994 275
.151	.235 610 105	.458 745 515	.859 847 699	.989 684 701	.998 974 790
.152	.198 165 923	.453 072 766	.858 988 281	.989 554 499	.998 955 064
.153	.161 248 144	.447 442 848	.858 129 722	.989 423 569	.998 935 097
.154	.124 846 237	.441 855 198	.857 272 021	.989 291 913	.998 914 888
.155	.088 949 948	.436 309 262	.856 415 177	.989 159 529	.998 894 435
.156	.053 549 284	.430 804 500	.855 559 190	.989 026 424	.998 873 737
.157	.018 634 518	.425 340 379	.854 704 059	.988 892 596	.998 852 792
.158	3.984 196 166	.419 916 378	.853 849 782	.988 758 048	.998 831 601
.159	.950 224 990	.414 531 985	.852 996 359	.988 622 780	.998 810 161
.160	.916 711 982	.409 186 699	.852 143 789	.988 486 795	.998 788 471
.161	.883 648 367	.403 880 025	.851 292 071	.988 350 095	.998 766 531
.162	.851 025 583	.398 611 482	.850 441 205	.988 212 680	.998 744 338
.163	.818 835 286	393 380 594	.849 591 188	.988 074 552	.998 721 893
.164	.787 069 335	.388 186 896	.848 742 022	.987 935 713	.998 699 192
.165	.755 719 791	.383 029 931	.847 893 704	.987 796 165	.998 676 237
.166	.724 778 909	.377 909 249	.847 046 234	.987 655 909	.998 653 024
.167	.694 239 132	.372 824 409	.846 199 611	.987 514 946	.998 629 554
.168	.664 093 085	.367 774 979	.845 353 835	.987 373 279	.998 605 824
.169	.634 333 571	.362 760 532	.844 508 903	.987 230 908	.998 581 835
.170	.604 953 563	.357 780 652	.843 664 817	.987 087 835	.998 557 584
.171	.575 946 203	.352 834 928	.842 821 573	.986 944 063	.998 533 071
.172	.547 304 794	.347 922 957	.841 979 173	.986 799 591	.998 508 294
.173	.519 022 796	.343 044 342	.841 137 615	.986 654 422	.998 483 252
.174	.491 093 821	.338 198 694	.840 296 898	.986 508 558	.998 457 945
.175	463 511 632	.333 385 630	.839 457 021	.986 361 999	.998 432 370
.176	.436 270 130	.328 604 775	.838 617 983	.986 214 748	.998 406 527
.177	.409 363 363	.323 855 759	.837 779 785	.986 066 806	.998 380 416
.178	.382 785 510	.319 138 217	.836 942 423	.985 918 175	.998 354 033
.179	.356 530 885	.314 451 793	.836 105 899	.985 768 854	.998 327 380
.180	.330 593 928	.309 796 135	.835 270 211	.985 618 849	.998 300 454
.181	.304 969 205	.305 170 898	.834 435 359	.985 468 159	.998 273 254
.182	.279 651 403	.300 575 742	.833 601 340	.985 316 784	.998 245 780
.183	.254 635 327	.296 010 333	.832 768 156	.985 164 728	.998 218 029
.184	.229 915 895	.291 474 343	.831 935 804	.985 011 992	.998 190 002
.185	.205 488 142	.286 967 446	.831 104 284	.984 858 576	.998 161 697
.186	.181 347 206	.282 489 326	.830 273 595	.984 704 483	.998 133 113
.187	.157 488 332	.278 039 670	.829 443 736	.984 549 715	.998 104 248
.188	.133 906 870	.273 618 168	.828 614 707	.984 394 272	.998 075 103
.189	.110 598 268	.269 224 519	.827 786 507	.984 238 156	998 045 675
.190	.087 558 070	.264 858 424	.826 959 134	.984 081 369	.998 015 964
.191	.064 781 919	.260 519 590	.826 132 588	.983 923 913	.997 985 968
.192	.042 265 547	.256 207 726	.825 306 868	.983 765 787	.997 955 687
.193	.020 004 778	.251 922 549	.824 481 974	.983 606 995	.997 925 119
.194	2.997 995 521	.247 663 779	.823 657 904	.983 447 538	.997 894 264
.195	.976 233 774	.243 431 139	.822 834 658	.983 287 416	.997 863 121
.196	.954 715 614	.239 224 359	.822 012 235	.983 126 633	.997 831 687
.197	.933 437 201	.235 043 171	.821 190 633	.982 965 188	.997 799 963
.198	.912 394 776	.230 887 311	.820 369 853	.982 803 082	.997 767 948
.199	.891 584 652	.226 756 521	.819 549 893	.982 640 322	.997 735 640
.200	.871 003 221	.222 650 544	818 730 753	.982 476 904	.997 703 038

TABLE I

x	$\int_x^\infty \frac{e^{-x}}{x^2}dx$	$\int_x^\infty \frac{e^{-x}}{x}dx$	$\int_x^\infty e^{-x}\,dx$	$\int_x^\infty xe^{-x}\,dx$	$\int_x^\infty x^2e^{-x}\,dx$
.200	2.871 003 221	1.222 650 544	0.818 730 753	0.982 476 904	1.997 703 038
.201	.850 646 947	.218 569 130	.817 912 432	.982 312 830	.997 670 141
.202	.830 512 366	.214 512 030	.817 094 928	.982 148 103	.997 636 948
.203	.810 596 081	.210 479 000	.816 278 241	.981 982 724	.997 603 459
.204	.790 894 765	.206 469 800	.815 462 371	.981 816 695	.997 569 672
.205	.771 405 155	.202 484 193	.814 647 316	.981 650 016	.997 535 586
.206	.752 124 057	.198 521 944	.813 833 076	.981 482 690	.997 501 200
.207	.733 048 335	.194 582 824	.813 019 650	.981 314 718	.997 466 514
.208	.714 174 916	.190 666 607	.812 207 037	.981 146 100	.997 431 526
.209	.695 500 787	.186 773 068	.811 395 236	.980 976 840	.997 396 235
.210	.677 022 995	.182 901 986	.810 584 246	.980 806 938	.997 360 640
.211	.658 738 640	.179 053 146	.809 774 067	.980 636 394	.997 324 741
.212	.640 644 883	.175 226 332	.808 964 698	.980 465 213	.997 288 536
.213	.622 738 936	.171 421 333	.808 156 137	.980 293 394	.997 252 025
.214	.605 018 063	.167 637 942	.807 348 385	.980 120 939	.997 215 205
.215	.587 479 583	.163 875 953	.806 541 440	.979 947 850	.997 178 078
.216	.570 120 863	.160 135 164	.805 735 302	.979 774 127	.997 140 640
.217	.552 939 322	.156 415 375	.804 929 969	.979 599 773	.997 102 893
.218	.535 932 425	.152 716 390	.804 125 442	.979 424 788	.997 064 833
.219	.519 097 686	.149 038 013	.803 321 718	.979 249 174	.997 026 462
.220	.502 432 663	.145 380 055	.802 518 798	.979 072 934	.996 987 777
.221	.485 934 960	.141 742 326	.801 716 680	.978 896 067	.996 948 778
.222	.469 602 227	.138 124 639	.800 915 364	.978 718 575	.996 909 463
.223	.453 432 154	.134 526 811	.800 114 849	.978 540 461	.996 869 833
.224	.437 422 475	.130 948 661	.799 315 134	.978 361 725	.996 829 885
.225	.421 570 962	.127 390 010	.798 516 219	.978 182 368	.996 789 620
.226	.405 875 434	.123 850 680	.797 718 102	.978 002 393	.996 749 035
.227	.390 333 739	.120 330 500	.796 920 782	.977 821 800	.996 708 131
.228	.374 943 774	.116 829 295	.796 124 260	.977 640 590	.996 666 906
.229	.359 703 468	.113 346 897	.795 328 534	.977 458 768	.996 625 359
.230	.344 610 785	.109 883 139	.794 533 603	.977 276 331	.996 583 490
.231	.329 663 731	.106 437 854	.793 739 466	.977 093 283	.996 541 297
.232	.314 860 340	.103 010 881	.792 946 123	.976 909 624	.996 498 780
.233	.300 198 686	.099 602 059	.792 153 574	.976 725 356	.996 455 938
.234	.285 676 874	.096 211 228	.791 361 816	.976 540 481	.996 412 769
.235	.271 293 044	.092 838 231	.790 570 850	.976 354 999	.996 369 274
.236	.257 045 361	.089 482 914	.789 780 674	.976 168 913	.996 325 450
.237	.242 932 041	.086 145 124	.788 991 288	.975 982 223	.996 281 298
.238	.228 951 304	.082 824 709	.788 202 691	.975 794 932	.996 236 816
.239	.215 101 416	.079 521 522	.787 414 882	.975 607 039	.996 192 004
.240	.201 380 673	.076 235 415	.786 627 861	.975 418 548	.996 146 860
.241	.187 787 394	.072 966 242	.785 841 626	.975 229 458	.996 101 384
.242	.174 319 932	.069 713 860	.785 056 178	975 039 773	.996 055 575
.243	.160 976 658	.066 478 127	.784 271 514	.974 849 492	.996 009 432
.244	.147 755 991	.063 258 904	.783 487 634	.974 658 617	.995 962 954
.245	.134 656 349	.060 056 052	.782 704 538	.974 467 150	.995 916 140
246	.121 676 196	.056 869 434	.781 922 225	.974 275 092	.995 868 990
.247	.108 814 013	.053 698 916	.781 140 694	.974 082 445	.995 821 502
.248	.096 068 311	.050 544 364	.780 359 943	.973 889 209	.995 773 676
.249	.083 437 620	.047 405 647	.779 579 973	.973 695 387	.995 725 511
.250	070 920 498	.044 282 634	.778 800 783	.973 500 979	.995 677 007

TABLE I

x	$\int_x^\infty \frac{e^{-x}}{x^2}dx$	$\int_x^\infty \frac{e^{-x}}{x}dx$	$\int_x^\infty e^{-x}\,dx$	$\int_x^\infty xe^{-x}\,dx$	$\int_x^\infty x^2e^{-x}\,dx$
.250	2.070 920 498	1.044 282 634	0.778 800 783	0.973 500 979	1.995 677 007
.251	.058 515 525	.041 175 198	.778 022 372	.973 305 987	.995 628 161
.252	.046 221 305	.038 083 211	.777 244 738	.973 110 412	.995 578 974
.253	.034 036 463	.035 006 548	.776 467 882	.972 914 255	.995 529 444
.254	.021 959 648	.031 945 084	.775 691 802	.972 717 520	.995 479 572
.255	.009 989 530	.028 898 697	.774 916 498	.972 520 205	.995 429 355
.256	1.998 124 799	.025 867 267	.774 141 969	.972 322 313	.995 378 794
.257	.986 364 166	.022 850 674	.773 368 214	.972 123 845	.995 327 887
.258	.974 706 365	.019 848 798	.772 595 232	.971 924 802	.995 276 633
.259	.963 150 148	.016 861 524	.771 823 023	.971 725 186	.995 225 032
.260	.951 694 285	.013 888 737	.771 051 586	.971 524 998	.995 173 083
.261	.940 337 570	.010 930 321	.770 280 920	.971 324 240	.995 120 786
.262	.929 078 812	.007 986 164	.769 511 024	.971 122 912	.995 068 139
.263	.917 916 840	.005 056 154	.768 741 897	.970 921 016	.995 015 141
.264	.906 850 500	.002 140 181	.767 973 540	.970 718 554	.994 961 792
.265	.895 878 656	0.999 238 136	.767 205 950	.970 515 527	.994 908 091
.266	.885 000 191	.996 349 912	.766 439 128	.970 311 935	.994 854 038
.267	.874 214 005	.993 475 401	.765 673 071	.970 107 782	.994 799 631
.268	.863 519 014	.990 614 498	.764 907 781	.969 903 066	.994 744 869
.269	.852 914 149	.987 767 099	.764 143 256	.969 697 791	.994 689 753
.270	842 398 360	.984 933 101	.763 379 494	.969 491 958	.994 634 281
.271	.831 970 610	.982 112 403	.762 616 496	.969 285 567	.994 578 452
.272	.821 629 881	.979 304 902	.761 854 261	.969 078 620	.994 522 266
.273	.811 375 169	.976 510 500	.761 092 788	.968 871 118	.994 465 722
.274	.801 205 483	.973 729 098	.760 332 075	.968 663 064	.994 408 819
.275	.791 119 850	.970 960 598	.759 572 123	.968 454 457	.994 351 556
.276	.781 117 308	.968 204 905	.758 812 931	.968 245 300	.994 293 933
.277	.771 196 912	.965 461 922	.758 054 497	.968 035 593	.994 235 949
.278	.761 357 730	.962 731 556	.757 296 822	.967 825 338	.994 177 603
.279	.751 598 843	.960 013 713	.756 539 903	.967 614 536	.994 118 895
.280	.741 919 348	.957 308 300	.755 783 741	.967 403 189	.994 059 823
.281	.732 318 351	.954 615 227	.755 028 335	.967 191 298	.994 000 388
.282	.722 794 975	.951 934 403	.754 273 685	.966 978 864	.993 940 588
.283	.713 348 352	949 265 739	.753 519 788	.966 765 888	.993 880 422
.284	.703 977 631	.946 609 146	.752 766 645	.966 552 372	.993 819 890
.285	.694 681 970	.943 964 536	.752 014 254	.966 338 317	.993 758 991
.286	.685 460 539	.941 331 824	.751 262 616	.966 123 724	.993 697 725
.287	.676 312 526	.938 710 923	.750 511 729	.965 908 595	.993 636 091
.288	.667 237 113	.936 101 749	.749 761 592	.965 692 931	.993 574 087
.289	.658 233 517	.933 504 218	.749 012 205	.965 476 733	.993 511 714
.290	.649 300 953	.930 918 246	.748 263 568	.965 260 002	.993 448 970
.291	.640 438 647	.928 343 752	.747 515 678	.965 042 740	.993 385 856
.292	.631 645 839	.925 780 654	.746 768 536	.964 824 949	.993 322 369
.293	.622 921 779	.923 228 872	.746 022 141	.964 606 628	.993 258 511
.294	.614 265 726	.920 688 327	.745 276 491	.964 387 780	.993 194 279
.295	.605 676 952	.918 158 938	.744 531 587	.964 168 406	.993 129 673
.296	.597 154 736	.915 640 629	.743 787 428	.963 948 507	.993 064 693
.297	.588 698 369	.913 133 322	.743 044 012	.963 728 084	.992 999 337
.298	.580 307 153	.910 636 940	.742 301 340	.963 507 139	.992 933 606
.299	.571 980 396	.908 151 408	.741 559 409	.963 285 673	.992 867 498
.300	.563 717 417	.905 676 652	.740 818 221	.963 063 687	.992 801 014

TABLE I

x	$\int_x^\infty \frac{e^{-x}}{x^2}dx$	$\int_x^\infty \frac{e^{-x}}{x}dx$	$\int_x^\infty e^{-x}\,dx$	$\int_x^\infty xe^{-x}\,dx$	$\int_x^\infty x^2e^{-x}\,dx$
.300	1.563 717 417	0.905 676 652	0.740 818 221	0.963 063 687	1.992 801 014
.301	.555 517 546	.903 212 596	.740 077 773	.962 841 182	.992 734 151
.302	.547 380 121	.900 759 167	.739 338 065	.962 618 160	.992 666 910
.303	.539 304 487	.898 316 293	.738 599 096	.962 394 623	.992 599 290
.304	.531 290 002	.895 883 901	.737 860 866	.962 170 570	.992 531 290
.305	.523 336 028	.893 461 921	.737 123 374	.961 946 004	.992 462 909
.306	.515 441 938	.891 050 282	.736 386 619	.961 720 925	.992 394 148
.307	.507 607 115	.888 648 914	.735 650 601	.961 495 335	.992 325 004
.308	.499 830 948	.886 257 747	.734 915 318	.961 269 236	.992 255 479
.309	.492 112 833	.883 876 714	.734 180 770	.961 042 628	.992 185 570
.310	.484 452 177	.881 505 746	.733 446 956	.960 815 513	.992 115 278
.311	.476 848 395	.879 144 775	.732 713 876	.960 587 891	.992 044 601
.312	.469 300 905	.876 793 737	.731 981 528	.960 359 765	.991 973 540
.313	.461 809 137	.874 452 564	.731 249 913	.960 131 135	.991 902 093
.314	.454 372 528	.872 121 192	.730 519 028	.959 902 003	.991 830 260
.315	.446 990 521	.869 799 556	.729 788 874	.959 672 370	.991 758 040
.316	.439 662 568	.867 487 591	.729 059 450	.959 442 235	.991 685 433
.317	.432 388 123	.865 185 234	.728 330 755	.959 211 604	.991 612 438
.318	.425 166 660	.862 892 423	.727 602 788	.958 980 475	.991 539 055
.319	.417 997 643	.860 609 095	.726 875 549	.958 748 850	.991 465 282
.320	.410 880 552	.858 335 189	.726 149 037	.958 516 729	.991 391 119
.321	.403 814 873	.856 070 644	.725 423 251	.958 284 115	.991 316 566
.322	.396 800 100	.853 815 398	.724 698 190	.958 051 008	.991 241 622
.323	.389 835 729	.851 569 393	.723 973 854	.957 817 409	.991 166 287
.324	.382 921 267	.849 332 568	.723 250 242	.957 583 321	.991 090 559
.325	.376 056 222	.847 104 866	.722 527 354	.957 348 744	.991 014 439
.326	.369 240 115	.844 886 227	.721 805 187	.957 113 678	.990 937 925
.327	.362 472 467	.842 676 594	.721 083 743	.956 878 127	.990 861 018
.328	.355 752 809	.840 475 910	.720 363 020	.956 642 090	.990 783 715
.329	.349 080 675	.838 284 118	.719 643 017	.956 405 569	.990 706 018
.330	.342 455 607	.836 101 161	.718 923 733	.956 168 565	.990 627 925
.331	.335 877 151	.833 926 985	.718 205 169	.955 931 080	.990 549 437
.332	.329 344 859	.831 761 535	.717 487 323	.955 693 114	.990 470 551
.333	.322 858 292	.829 604 754	.716 770 194	.955 454 669	.990 391 268
.334	.316 417 005	.827 456 591	.716 053 782	.955 215 745	.990 311 587
.335	.310 020 582	.825 316 989	.715 338 086	.954 976 345	.990 231 507
.336	.303 668 584	.823 185 898	.714 623 106	.954 736 469	.990 151 029
.337	.297 360 594	.821 063 263	.713 908 840	.954 496 119	.990 070 151
.338	.291 096 197	.818 949 033	.713 195 288	.954 255 294	.989 988 873
.339	.284 874 984	.816 843 155	.712 482 449	.954 013 999	.989 907 194
.340	.278 696 546	.814 745 580	.711 770 323	.953 772 233	.989 825 114
.341	.272 560 486	.812 656 254	.711 058 908	.953 529 996	.989 742 633
.342	.266 466 404	.810 575 130	.710 348 205	.953 287 291	.989 659 749
.343	.260 413 914	.808 502 155	.709 638 212	.953 044 118	.989 576 462
.344	.254 402 626	.806 437 281	.708 928 928	.952 800 479	.989 492 772
.345	.248 432 159	.804 380 459	.708 220 353	.952 556 375	.989 408 678
.346	.242 502 137	.802 331 640	.707 512 487	.952 311 808	.989 324 180
.347	.236 612 188	.800 290 775	.706 805 328	.952 066 777	.989 239 277
.348	.230 761 941	.798 257 818	.706 098 876	.951 821 285	.989 153 969
.349	.224 951 034	.796 232 720	.705 393 130	.951 575 333	.989 068 254
.350	.219 179 107	.794 215 435	.704 688 090	.951 328 921	.988 982 133

TABLE I

x	$\int_x^\infty \frac{e^{-x}}{x^2}dx$	$\int_x^\infty \frac{e^{-x}}{x}dx$	$\int_x^\infty e^{-x}\,dx$	$\int_x^\infty xe^{-x}\,dx$	$\int_x^\infty x^2e^{-x}\,dx$
.350	1.219 179 107	0.794 215 435	0.704 688 090	0.951 328 921	1.988 982 133
.351	.213 445 805	.792 205 915	.703 983 754	.951 082 052	.988 895 605
.352	.207 750 776	.790 204 116	.703 280 122	.950 834 725	.988 808 670
.353	.202 093 674	.788 209 990	.702 577 193	.950 586 943	.988 721 327
.354	.196 474 155	.786 223 493	.701 874 967	.950 338 706	.988 633 575
.355	.190 891 880	.784 244 580	.701 173 443	.950 090 016	.988 545 414
.356	.185 346 514	.782 273 206	.700 472 620	.949 840 873	.988 456 844
.357	.179 837 726	.780 309 326	.699 772 498	.949 591 279	.988 367 864
.358	.174 365 190	.778 352 897	.699 073 075	.949 341 236	.988 278 473
.359	.168 928 580	.776 403 875	.698 374 351	.949 090 744	.988 188 672
.360	.163 527 577	.774 462 218	.697 676 326	.948 839 803	.988 098 459
.361	.158 161 865	.772 527 881	.696 978 998	.948 588 417	.988 007 834
.362	.152 831 131	.770 600 824	.696 282 368	.948 336 585	.987 916 797
.363	.147 535 067	.768 681 003	.695 586 433	.948 084 309	.987 825 346
.364	.142 273 366	.766 768 378	.694 891 195	.947 831 590	.987 733 483
.365	.137 045 727	.764 862 906	.694 196 651	.947 578 428	.987 641 206
.366	.131 851 850	.762 964 547	.693 502 801	.947 324 826	.987 548 514
.367	.126 691 440	.761 073 260	.692 809 645	.947 070 785	.987 455 408
.368	.121 564 207	.759 189 004	.692 117 182	.946 816 305	.987 361 886
.369	.116 469 860	.757 311 740	.691 425 410	.946 561 387	.987 267 949
.370	.111 408 114	.755 441 428	.690 734 331	.946 306 033	.987 173 596
.371	.106 378 688	.753 578 028	.690 043 942	.946 050 244	.987 078 826
.372	.101 381 301	.751 721 501	.689 354 243	.945 794 021	.986 983 639
.373	.096 415 678	.749 871 810	.688 665 233	.945 537 365	.986 888 035
.374	.091 481 545	.748 028 914	.687 976 912	.945 280 277	.986 792 012
.375	.086 578 634	.746 192 776	.687 289 279	.945 022 757	.986 695 572
.376	.081 706 677	.744 363 358	.686 602 333	.944 764 810	.986 598 712
.377	.076 865 408	.742 540 624	.685 916 074	.944 506 434	.986 501 433
.378	.072 054 568	.740 724 534	.685 230 501	.944 247 630	.986 403 735
.379	.067 273 899	.738 915 053	.684 545 613	.943 988 400	.986 305 616
.380	.062 523 143	.737 112 144	.683 861 409	.943 728 745	.986 207 077
.381	.057 802 050	.735 315 771	.683 177 890	.943 468 666	.986 108 117
.382	.053 110 368	.733 525 897	.682 495 053	.943 208 164	.986 008 735
.383	.048 447 852	.731 742 486	.681 812 899	.942 947 240	.985 908 932
.384	.043 814 254	.729 965 504	.681 131 427	.942 685 895	.985 808 706
.385	.039 209 335	.728 194 915	.680 450 636	.942 424 131	.985 708 058
.386	.034 632 854	.726 430 684	.679 770 526	.942 161 949	.985 606 986
.387	.030 084 575	.724 672 776	.679 091 095	.941 899 349	.985 505 492
.388	.025 564 263	.722 921 158	.678 412 343	.941 636 332	.985 403 573
.389	.021 071 687	.721 175 794	.677 734 270	.941 372 901	.985 301 230
.390	.016 606 616	.719 436 652	.677 056 874	.941 109 056	.985 198 462
.391	.012 168 826	.717 703 696	.676 380 156	.940 844 797	.985 095 269
.392	.007 758 090	.715 976 895	.675 704 114	.940 580 127	.984 991 650
.393	.003 374 186	.714 256 215	.675 028 748	.940 315 045	.984 887 606
.394	0.999 016 893	.712 541 625	.674 354 056	.940 049 554	.984 783 135
.395	.994 685 999	.710 833 088	.673 680 039	.939 783 655	.984 678 238
.396	.990 381 283	.709 130 575	.673 006 696	.939 517 347	.984 572 913
.397	.986 102 535	.707 434 053	.672 334 026	.939 250 634	.984 467 161
.398	.981 849 543	.705 743 491	.671 662 028	.938 983 515	.984 360 981
.399	.977 622 099	.704 058 857	.670 990 701	.938 715 991	.984 254 373
400	.973 419 996	.702 380 119	.670 320 046	.938 448 064	.984 147 336

TABLE I

x	$\int_x^\infty \frac{e^{-x}}{x^2}dx$	$\int_x^\infty \frac{e^{-x}}{x}dx$	$\int_x^\infty e^{-x}\,dx$	$\int_x^\infty xe^{-x}\,dx$	$\int_x^\infty x^2e^{-x}\,dx$
.400	0.973 419 996	0.702 380 119	0.670 320 046	0.938 448 064	1.984 147 336
.401	.969 243 031	.700 707 246	.669 650 061	.938 179 735	.984 039 870
.402	.965 091 000	.699 040 208	.668 980 746	.937 911 005	.983 931 975
.403	.960 963 705	.697 378 973	.668 312 099	.937 641 875	.983 823 650
.404	.956 860 947	.695 723 512	.667 644 121	.937 372 346	.983 714 895
.405	.952 782 529	.694 073 794	.666 976 811	.937 102 419	.983 605 710
.406	.948 728 258	.692 429 790	.666 310 167	.936 832 095	.983 496 094
.407	.944 697 942	.690 791 469	.665 644 190	.936 561 376	.983 386 046
.408	.940 691 392	.689 158 801	.664 978 879	.936 290 261	.983 275 567
.409	.936 708 418	.687 531 759	.664 314 232	.936 018 753	.983 164 656
.410	.932 748 836	.685 910 311	.663 650 250	.935 746 853	.983 053 312
.411	.928 812 459	.684 294 431	.662 986 932	.935 474 560	.982 941 535
.412	.924 899 106	.682 684 088	.662 324 276	.935 201 878	.982 829 327
.413	.921 008 597	.681 079 255	.661 662 283	.934 928 806	.982 716 685
.414	.917 140 752	.679 479 903	.661 000 951	.934 655 345	.982 603 609
.415	.913 295 395	.677 886 004	.660 340 281	.934 381 497	.982 490 099
.416	.909 472 350	.676 297 531	.659 680 270	.934 107 263	.982 376 155
.417	.905 671 444	.674 714 455	.659 020 920	.933 832 643	.982 261 776
.418	.901 892 505	.673 136 750	.658 362 228	.933 557 640	.982 146 962
.419	.898 135 362	.671 564 388	.657 704 195	.933 282 253	.982 031 712
.420	.894 399 849	.669 997 341	.657 046 820	.933 006 484	.981 916 027
.421	.890 685 797	.668 435 584	.656 390 101	.932 730 334	.981 799 906
.422	.886 993 041	.666 879 090	.655 734 039	.932 453 804	.981 683 349
.423	.883 321 420	.665 327 831	.655 078 633	.932 176 895	.981 566 355
.424	.879 670 770	.663 781 782	.654 423 882	.931 899 607	.981 448 923
.425	.876 040 929	.662 240 918	.653 769 785	.931 621 944	.981 331 055
.426	.872 431 743	.660 705 210	.653 116 342	.931 343 904	.981 212 749
.427	.868 843 052	.659 174 635	.652 463 552	.931 065 489	.981 094 005
.428	.865 274 700	.657 649 166	.651 811 415	.930 786 700	.980 974 823
.429	.861 726 534	.656 128 779	.651 159 929	.930 507 539	.980 855 202
.430	.858 198 401	.654 613 447	.650 509 095	.930 228 005	.980 735 143
.431	.854 690 149	.653 103 147	.649 858 911	.929 948 101	.980 614 644
.432	.851 201 630	.651 597 853	.649 209 377	.929 667 827	.980 493 706
.433	.847 732 695	.650 097 540	.648 560 492	.929 387 185	.980 372 328
.434	.844 283 197	.648 602 184	.647 912 255	.929 106 174	.980 250 510
.435	.840 852 991	.647 111 761	.647 264 667	.928 824 797	.980 128 251
.436	.837 441 933	.645 626 246	.646 617 726	.928 543 054	.980 005 552
.437	.834 049 878	.644 145 617	.645 971 431	.928 260 947	.979 882 412
.438	.830 676 688	.642 669 848	.645 325 783	.927 978 476	.979 758 831
.439	.827 322 222	.641 198 916	.644 680 780	.927 695 642	.979 634 808
.440	.823 986 341	.639 732 798	.644 036 421	.927 412 446	.979 510 344
.441	.820 668 908	.638 271 470	.643 392 707	.927 128 890	.979 385 437
.442	.817 369 787	.636 814 909	.642 749 635	.926 844 974	.979 260 088
.443	.814 088 842	.635 363 093	.642 107 207	.926 560 700	.979 134 297
.444	.810 825 941	.633 915 998	.641 465 421	.926 276 068	.979 008 063
.445	.807 580 952	.632 473 601	.640 824 276	.925 991 079	.978 881 385
.446	.804 353 742	.631 035 881	.640 183 772	.925 705 734	.978 754 264
.447	.801 144 184	.629 602 814	.639 543 908	.925 420 035	.978 626 699
.448	.797 952 147	.628 174 380	.638 904 684	.925 133 981	.978 498 691
.449	.794 777 505	.626 750 554	.638 266 099	.924 847 577	.978 370 238
.450	.791 620 132	.625 331 316	.637 628 152	.924 560 820	.978 241 340

TABLE I

x	$\int_x^\infty \frac{e^{-x}}{x^2}dx$	$\int_x^\infty \frac{e^{-x}}{x}dx$	$\int_x^\infty e^{-x}\,dx$	$\int_x^\infty xe^{-x}\,dx$	$\int_x^\infty x^2e^{-x}\,dx$
.450	0.791 620 132	0.625 331 316	0.637 628 152	0.924 560 820	1.978 241 340
.451	.788 479 902	.623 916 644	.636 990 842	.924 273 712	.978 111 998
.452	.785 356 691	.622 506 516	.636 354 170	.923 986 254	.977 982 211
.453	.782 250 378	.621 100 910	.635 718 134	.923 698 448	.977 851 979
.454	.779 160 840	.619 699 806	.635 082 733	.923 410 294	.977 721 301
.455	.776 087 956	.618 303 182	.634 447 968	.923 121 793	.977 590 177
.456	.773 031 608	.616 911 017	.633 813 837	.922 832 947	.977 458 608
.457	.769 991 677	.615 523 290	.633 180 340	.922 543 756	.977 326 592
.458	.766 968 047	.614 139 980	.632 547 476	.922 254 220	.977 194 129
.459	.763 960 599	.612 761 067	.631 915 245	.921 964 342	.977 061 220
.460	.760 969 221	.611 386 530	.631 283 646	.921 674 122	.976 927 864
.461	.757 993 797	.610 016 349	.630 652 677	.921 383 562	.976 794 061
.462	.755 034 215	.608 650 503	.630 022 340	.921 092 661	.976 659 809
.463	.752 090 363	.607 288 973	.629 392 633	.920 801 421	.976 525 112
.464	.749 162 129	.605 931 738	.628 763 554	.920 509 844	.976 389 966
.465	.746 249 405	.604 578 778	.628 135 105	.920 217 929	.976 254 371
.466	.743 352 080	.603 230 075	.627 507 284	.919 925 678	.976 118 329
.467	.740 470 047	.601 885 607	.626 880 090	.919 633 093	.975 981 837
.468	.737 603 198	.600 545 357	.626 253 524	.919 340 173	.975 844 897
469	.734 751 428	.599 209 304	.625 627 583	.919 046 919	.975 707 508
.470	.731 914 631	.597 877 429	.625 002 268	.918 753 334	.975 569 670
.471	.729 092 703	.596 549 714	.624 377 578	.918 459 418	.975 431 382
472	.726 285 542	.595 226 138	.623 753 513	.918 165 171	.975 292 645
.473	.723 493 044	.593 906 684	.623 130 071	.917 870 595	.975 153 457
.474	.720 715 107	.592 591 333	.622 507 253	.917 575 690	.975 013 820
.475	.717 951 633	.591 280 065	.621 885 056	.917 280 458	.974 873 732
.476	.715 202 520	.589 972 863	.621 263 482	.916 984 900	.974 733 194
.477	.712 467 670	.588 669 708	.620 642 529	.916 689 016	.974 592 206
.478	.709 746 985	.587 370 582	.620 022 197	.916 392 807	.974 450 766
.479	.707 040 367	.586 075 467	.619 402 485	.916 096 275	.974 308 875
.480	.704 347 722	.584 784 344	.618 783 392	.915 799 420	.974 166 533
.481	.701 668 952	.583 497 197	.618 164 918	.915 502 243	.974 023 740
.482	.699 003 964	.582 214 006	.617 547 062	.915 204 746	.973 880 495
.483	.696 352 664	.580 934 755	.616 929 823	.914 906 928	.973 736 798
.484	.693 714 959	.579 659 425	.616 313 202	.914 608 792	.973 592 649
.485	.691 090 756	.578 388 000	.615 697 197	.914 310 337	.973 448 047
.486	.688 479 965	.577 120 462	.615 081 807	.914 011 566	.973 302 994
.487	.685 882 493	.575 856 794	.614 467 033	.913 712 478	.973 157 488
.488	.683 298 254	.574 596 978	.613 852 873	.913 413 075	.973 011 529
.489	.680 727 155	.573 340 998	.613 239 327	.913 113 358	.972 865 117
.490	.678 169 111	.572 088 836	.612 626 394	.912 813 327	.972 718 252
.491	.675 624 033	.570 840 476	.612 014 074	.912 512 984	.972 570 934
.492	.673 091 833	.569 595 902	.611 402 366	.912 212 330	.972 423 162
.493	.670 572 428	.568 355 095	.610 791 269	.911 911 365	.972 274 937
.494	.668 065 730	.567 118 041	.610 180 783	.911 610 089	.972 126 257
.495	.665 571 656	.565 884 722	.609 570 907	.911 308 506	.971 977 124
.496	.663 090 121	.564 655 123	.608 961 641	.911 006 615	.971 827 537
.497	.660 621 043	.563 429 226	.608 352 984	.910 704 417	.971 677 496
.498	.658 164 338	.562 207 017	.607 744 935	.910 401 912	.971 527 000
.499	.655 719 926	.560 988 478	.607 137 494	.910 099 103	.971 376 049
.500	.653 287 724	.559 773 595	.606 530 660	.909 795 990	.971 224 644

TABLE I

x	$\int_x^\infty \frac{e^{-x}}{x^2}dx$	$\int_x^\infty \frac{e^{-x}}{x}dx$	$\int_x^\infty e^{-x}\,dx$	$\int_x^\infty xe^{-x}\,dx$	$\int_x^\infty x^2e^{-x}\,dx$
.500	0.653 287 724	0.559 773 595	0.606 530 660	0.909 795 990	1.971 224 644
.501	.650 867 653	.558 562 351	.605 924 432	.909 492 573	.971 072 784
.502	.648 459 634	.557 354 730	.605 318 811	.909 188 854	.970 920 469
.503	.646 063 586	.556 150 717	.604 713 794	.908 884 833	.970 767 698
.504	.643 679 432	.554 950 296	.604 109 383	.908 580 512	.970 614 473
.505	.641 307 093	.553 753 452	.603 505 575	.908 275 891	.970 460 791
.506	.638 946 493	.552 560 170	.602 902 372	.907 970 971	.970 306 655
.507	.636 597 555	.551 370 434	.602 299 770	.907 665 754	.970 152 062
.508	.634 260 204	.550 184 229	.601 697 772	.907 360 240	.969 997 013
.509	.631 934 363	.549 001 540	.601 096 375	.907 054 428	.969 841 509
.510	.629 619 959	.547 822 352	.600 495 579	.906 748 324	.969 685 548
.511	.627 316 918	.546 646 650	.599 895 383	.906 441 924	.969 529 131
.512	.625 025 166	.545 474 420	.599 295 788	.906 135 231	.969 372 257
.513	.622 744 630	.544 305 646	.598 696 792	.905 828 246	.969 214 927
.514	.620 475 239	.543 140 314	.598 098 394	.905 520 969	.969 057 141
.515	.618 216 919	.541 978 410	.597 500 595	.905 213 401	.968 898 897
.516	.615 969 602	.540 819 919	.596 903 393	.904 905 543	.968 740 196
.517	.613 733 216	.539 664 826	.596 306 788	.904 597 396	.968 581 037
.518	.611 507 691	.538 513 118	.595 710 779	.904 288 962	.968 421 424
.519	.609 292 958	.537 364 780	.595 115 366	.903 980 241	.968 261 352
.520	.607 088 948	.536 219 798	.594 520 548	.903 671 233	.968 100 822
.521	.604 895 594	.535 078 158	.593 926 325	.903 361 940	.967 939 835
.522	.602 712 828	.533 939 845	.593 332 695	.903 052 362	.967 778 390
.523	.600 540 580	.532 804 848	.592 739 659	.902 742 501	.967 616 487
.524	.598 378 788	.531 673 150	.592 147 216	.902 432 357	.967 454 127
.525	.596 227 384	.530 544 739	.591 555 364	.902 121 931	.967 291 309
.526	.594 086 301	.529 419 601	.590 964 105	.901 811 224	.967 128 032
.527	.591 955 476	.528 297 723	.590 373 436	.901 500 237	.966 964 297
.528	.589 834 845	.527 179 090	.589 783 358	.901 188 970	.966 800 104
.529	.587 724 341	.526 063 691	.589 193 869	.900 877 426	.966 635 453
.530	.585 623 904	.524 951 510	.588 604 970	.900 565 604	.966 470 343
.531	.583 533 469	.523 842 536	.588 016 659	.900 253 505	.966 304 775
.532	.581 452 976	.522 736 754	.587 428 936	.899 941 130	.966 138 748
.533	.579 382 360	.521 634 152	.586 841 801	.899 628 481	.965 972 262
.534	.577 321 561	.520 534 717	.586 255 252	.899 315 557	.965 805 317
.535	.575 270 519	.519 438 435	.585 669 290	.899 002 360	.965 637 913
.536	.573 229 172	.518 345 294	.585 083 914	.898 688 891	.965 470 051
.537	.571 197 459	.517 255 282	.584 499 122	.898 375 151	.965 301 729
.538	.569 175 324	.516 168 384	.583 914 915	.898 061 139	.965 132 948
.539	.567 162 705	.515 084 590	.583 331 292	.897 746 859	.964 963 707
.540	.565 159 544	.514 003 886	.582 748 252	.897 432 309	.964 794 008
.541	.563 165 784	.512 926 259	.582 165 795	.897 117 491	.964 623 849
.542	.561 181 367	.511 851 697	.581 583 921	.896 802 406	.964 453 230
.543	.559 206 234	.510 780 188	.581 002 627	.896 487 054	.964 282 152
.544	.557 240 330	.509 711 720	.580 421 915	.896 171 437	.964 110 614
.545	.555 283 598	.508 646 280	.579 841 783	.895 855 555	.963 938 616
.546	.553 335 981	.507 583 857	.579 262 231	.895 539 410	.963 766 159
.547	.551 397 425	.506 524 437	.578 683 259	.895 223 001	.963 593 242
.548	.549 467 875	.505 468 009	.578 104 865	.894 906 331	.963 419 864
.549	.547 547 276	.504 414 561	.577 527 049	.894 589 399	.963 246 027
.550	.545 635 574	.503 364 081	.576 949 810	.894 272 206	.963 071 730

TABLE I

x	$\int_x^\infty \frac{e^{-x}}{x^2}dx$	$\int_x^\infty \frac{e^{-x}}{x}dx$	$\int_x^\infty e^{-x}\,dx$	$\int_x^\infty xe^{-x}\,dx$	$\int_x^\infty x^2e^{-x}\,dx$
.550	0.545 635 574	0.503 364 081	0.576 949 810	0.894 272 206	1.963 071 730
.551	.543 732 715	.502 316 557	.576 373 149	.893 954 754	.962 896 972
.552	.541 838 645	.501 271 978	.575 797 064	.893 637 043	.962 721 755
.553	.539 953 311	.500 230 332	.575 221 555	.893 319 074	.962 546 077
.554	.538 076 660	.499 191 608	.574 646 621	.893 000 848	.962 369 939
.555	.536 208 643	.498 155 792	.574 072 261	.892 682 366	.962 193 341
.556	.534 349 204	.497 122 875	.573 498 476	.892 363 629	.962 016 282
.557	.532 498 294	.496 092 844	.572 925 264	.892 044 636	.961 838 763
.558	.530 655 861	.495 065 689	.572 352 625	.891 725 390	.961 660 783
.559	.528 821 855	.494 041 398	.571 780 559	.891 405 891	.961 482 342
.560	.526 996 226	.493 019 959	.571 209 064	.891 086 140	.961 303 442
.561	.525 178 925	.492 001 361	.570 638 140	.890 766 137	.961 124 080
.562	.523 369 900	.490 985 594	.570 067 787	.890 445 884	.960 944 258
.563	.521 569 102	.489 972 647	.569 498 005	.890 125 381	.960 763 975
.564	.519 776 484	.488 962 507	.568 928 791	.889 804 629	.960 583 232
.565	.517 991 997	.487 955 165	.568 360 147	.889 483 630	.960 402 027
.566	.516 215 594	.486 950 609	.567 792 071	.889 162 383	.960 220 362
.567	.514 447 225	.485 948 829	.567 224 562	.888 840 888	.960 038 236
.568	.512 686 843	.484 949 814	.566 657 621	.888 519 150	.959 855 649
.569	.510 934 404	.483 953 552	.566 091 247	.888 197 167	.959 672 601
.570	.509 189 858	.482 960 034	.565 525 439	.887 874 939	.959 489 093
.571	.507 453 161	.481 969 249	.564 960 196	.887 552 468	.959 305 123
.572	.505 724 265	.480 981 186	.564 395 518	.887 229 754	.959 120 692
.573	.504 003 126	.479 995 835	.563 831 405	.886 906 800	.958 935 801
.574	.502 289 698	.479 013 185	.563 267 855	.886 583 604	.958 750 448
.575	.500 583 937	.478 033 226	.562 704 869	.886 260 168	.958 564 634
.576	.498 885 798	.477 055 947	.562 142 445	.885 936 494	.958 378 359
.577	.497 195 236	.476 081 339	.561 580 584	.885 612 580	.958 191 623
.578	.495 512 208	.475 109 390	.561 019 284	.885 288 429	.958 004 426
.579	.493 836 670	.474 140 092	.560 458 545	.884 964 042	.957 816 768
.580	.492 168 578	.473 173 433	.559 898 367	.884 639 419	.957 628 649
.581	.490 507 890	.472 209 404	.559 338 748	.884 314 560	.957 440 068
.582	.488 854 563	.471 247 995	.558 779 689	.883 989 468	.957 251 027
.583	.487 208 554	.470 289 196	.558 221 188	.883 664 140	.957 061 524
.584	.485 569 823	.469 332 996	.557 663 246	.883 338 582	.956 871 560
.585	.483 938 325	.468 379 387	.557 105 862	.883 012 791	.956 681 135
.586	.482 314 022	.467 428 358	.556 549 034	.882 686 769	.956 490 249
.587	.480 696 870	.466 479 899	.555 992 764	.882 360 515	.956 298 902
.588	.479 086 830	.465 534 001	.555 437 049	.882 034 032	.956 107 094
.589	.477 483 861	.464 590 654	.554 881 889	.881 707 322	.955 914 824
.590	.475 887 922	.463 649 849	.554 327 285	.881 380 383	.955 722 093
.591	.474 298 973	.462 711 576	.553 773 235	.881 053 216	.955 528 901
.592	.472 716 976	.461 775 825	.553 219 738	.880 725 823	.955 335 248
.593	.471 141 890	.460 842 587	.552 666 795	.880 398 204	.955 141 134
.594	.469 573 676	.459 911 853	.552 114 404	.880 070 360	.954 946 559
.595	.468 012 296	.458 983 613	.551 562 566	.879 742 292	.954 751 522
.596	.466 457 711	.458 057 858	.551 011 279	.879 414 001	.954 556 025
.597	.464 909 882	.457 134 579	.550 460 543	.879 085 487	.954 360 066
.598	.463 368 772	.456 213 766	.549 910 358	.878 756 752	.954 163 647
.599	.461 834 343	.455 295 410	.549 360 722	.878 427 795	.953 966 766
.600	.460 306 557	.454 379 503	.548 811 636	.878 098 618	.953 769 424

TABLE I

x	$\int_x^\infty \frac{e^{-x}}{x^2}dx$	$\int_x^\infty \frac{e^{-x}}{x}dx$	$\int_x^\infty e^{-x}\,dx$	$\int_x^\infty xe^{-x}\,dx$	$\int_x^\infty x^2e^{-x}\,dx$
.600	0.460 306 557	0.454 379 503	0.548 811 636	0.878 098 618	1.953 769 424
.601	.458 785 377	.453 466 035	.548 263 099	.877 769 221	.953 571 622
.602	.457 270 767	.452 554 997	.547 715 110	.877 439 606	.953 373 358
.603	.455 762 688	.451 646 381	.547 167 668	.877 109 772	.953 174 634
.604	.454 261 106	.450 740 176	.546 620 774	.876 779 722	.952 975 448
.605	.452 765 983	.449 836 375	.546 074 427	.876 449 455	.952 775 802
.606	.451 277 285	.448 934 968	.545 528 625	.876 118 972	.952 575 694
.607	.449 794 973	.448 035 948	.544 983 369	.875 788 274	.952 375 126
.608	.448 319 015	.447 139 304	.544 438 658	.875 457 362	.952 174 097
.609	.446 849 375	.446 245 028	.543 894 492	.875 126 237	.951 972 607
.610	.445 386 018	.445 353 112	.543 350 869	.874 794 899	.951 770 657
.611	.443 928 908	.444 463 547	.542 807 790	.874 463 349	.951 568 246
.612	.442 478 011	.443 576 324	.542 265 253	.874 131 588	.951 365 374
.613	.441 033 294	.442 691 435	.541 723 259	.873 799 617	.951 162 041
.614	.439 594 722	.441 808 872	.541 181 807	.873 467 436	.950 958 248
.615	.438 162 262	.440 928 625	.540 640 895	.873 135 046	.950 753 994
.616	.436 735 879	.440 050 687	.540 100 525	.872 802 448	.950 549 280
.617	.435 315 540	.439 175 050	.539 560 694	.872 469 642	.950 344 106
.618	.433 901 214	.438 301 704	.539 021 403	.872 136 630	.950 138 471
.619	.432 492 866	.437 430 641	.538 482 651	.871 803 412	.949 932 375
.620	.431 090 465	.436 561 854	.537 944 438	.871 469 989	.949 725 820
.621	.429 693 978	.435 695 333	.537 406 762	.871 136 361	.949 518 804
.622	.428 303 372	.434 831 072	.536 869 624	.870 802 530	.949 311 327
.623	.426 918 615	.433 969 062	.536 333 023	.870 468 496	.949 103 391
.624	.425 539 677	.433 109 294	.535 796 958	.870 134 259	.948 894 995
.625	.424 166 525	.432 251 761	.535 261 429	.869 799 821	.948 686 138
.626	.422 799 127	.431 396 455	.534 726 435	.869 465 183	.948 476 822
.627	.421 437 455	.430 543 367	.534 191 975	.869 130 344	.948 267 045
.628	.420 081 476	.429 692 490	.533 658 051	.868 795 305	.948 056 809
.629	.418 731 158	.428 843 817	.533 124 659	.868 460 070	.947 846 113
.630	.417 386 473	.427 997 338	.532 591 801	.868 124 636	.947 634 957
.631	.416 047 389	.427 153 047	.532 059 475	.867 789 004	.947 423 342
.632	.414 713 878	.426 310 935	.531 527 682	.867 453 177	.947 211 266
.633	.413 385 908	.425 470 995	.530 996 420	.867 117 154	.946 998 732
.634	.412 063 451	.424 633 219	.530 465 689	.866 780 936	.946 785 738
.635	.410 746 477	.423 797 599	.529 935 488	.866 444 523	.946 572 284
.636	.409 434 956	.422 964 128	.529 405 818	.866 107 918	.946 358 371
.637	.408 128 861	.422 132 798	.528 876 677	.865 771 118	.946 143 999
.638	.406 828 160	.421 303 602	.528 348 064	.865 434 129	.945 929 168
.639	.405 532 827	.420 476 532	.527 819 980	.865 096 948	.945 713 877
.640	.404 242 832	.419 651 581	.527 292 424	.864 759 575	.945 498 128
.641	.402 958 147	.418 828 741	.526 765 395	.864 422 014	.945 281 919
.642	.401 678 745	.418 008 004	.526 238 893	.864 084 262	.945 065 252
.643	.400 404 596	.417 189 365	.525 712 917	.863 746 323	.944 848 126
.644	.399 135 675	.416 372 814	.525 187 467	.863 408 196	.944 630 541
.645	.397 871 953	.415 558 345	.524 662 542	.863 069 882	.944 412 498
.646	.396 613 402	.414 745 951	.524 138 142	.862 731 381	.944 193 996
.647	.395 359 995	.413 935 624	.523 614 266	.862 392 695	.943 975 035
.648	.394 111 706	.413 127 357	.523 090 913	.862 053 825	.943 755 616
.649	.392 868 507	.412 321 144	.522 568 084	.861 714 770	.943 535 739
.650	.391 630 373	.411 516 976	.522 045 777	.861 375 532	.943 315 404

TABLE I

x	$\int_x^\infty \frac{e^{-x}}{x^2}dx$	$\int_x^\infty \frac{e^{-x}}{x}dx$	$\int_x^\infty e^{-x}\,dx$	$\int_x^\infty xe^{-x}\,dx$	$\int_x^\infty x^2e^{-x}\,dx$
.650	0.391 630 373	0.411 516 976	0.522 045 777	0.861 375 532	1.943 315 404
.651	.390 397 276	.410 714 847	.521 523 992	.861 036 111	.943 094 611
.652	.389 169 190	.409 914 750	.521 002 729	.860 696 508	.942 873 359
.653	.387 946 089	.409 116 677	.520 481 986	.860 356 723	.942 651 650
.654	.386 727 948	.408 320 622	.519 961 764	.860 016 758	.942 429 483
.655	.385 514 740	.407 526 577	.519 442 063	.859 676 614	.942 206 858
.656	.384 306 439	.406 734 537	.518 922 880	.859 336 290	.941 983 776
.657	.383 103 021	.405 944 493	.518 404 217	.858 995 787	.941 760 236
.658	.381 904 460	.405 156 439	.517 886 072	.858 655 107	.941 536 238
.659	.380 710 730	.404 370 369	.517 368 444	.858 314 249	.941 311 784
.660	.379 521 808	.403 586 275	.516 851 334	.857 973 215	.941 086 872
.661	.378 337 668	.402 804 150	.516 334 741	.857 632 006	.940 861 503
.662	.377 158 284	.402 023 989	.515 818 665	.857 290 621	.940 635 677
.663	.375 983 635	.401 245 783	.515 303 104	.856 949 062	.940 409 394
.664	.374 813 693	.400 469 528	.514 788 058	.856 607 329	.940 182 654
.665	.373 648 436	.399 695 215	.514 273 528	.856 265 424	.939 955 458
.666	.372 487 840	.398 922 838	.513 759 511	.855 923 346	.939 727 805
.667	.371 331 880	.398 152 391	.513 246 009	.855 581 096	.939 499 696
.668	.370 180 533	.397 383 867	.512 733 019	.855 238 676	.939 271 132
.669	.369 033 775	.396 617 260	.512 220 542	.854 896 085	.939 042 108
.670	.367 891 583	.395 852 563	.511 708 578	.854 553 325	.938 812 630
.671	.366 753 933	.395 089 770	.511 197 125	.854 210 396	.938 582 696
.672	.365 620 804	.394 328 874	.510 686 183	.853 867 299	.938 352 307
.673	.364 492 171	.393 569 868	.510 175 752	.853 524 033	.938 121 461
.674	.363 368 012	.392 812 747	.509 665 832	.853 180 602	.937 890 160
.675	.362 248 303	.392 057 505	.509 156 421	.852 837 005	.937 658 403
.676	.361 133 024	.391 304 134	.508 647 519	.852 493 241	.937 426 191
.677	.360 022 151	.390 552 628	.508 139 125	.852 149 313	.937 193 524
.678	.358 915 661	.389 802 982	.507 631 240	.851 805 220	.936 960 401
.679	.357 813 534	.389 055 189	.507 123 863	.851 460 966	.936 726 824
.680	.356 715 746	.388 309 243	.506 616 992	.851 116 547	.936 492 792
.681	.355 622 277	.387 565 137	.506 110 629	.850 771 967	.936 258 305
.682	.354 533 103	.386 822 866	.505 604 771	.850 427 225	.936 023 363
.683	.353 448 205	.386 082 423	.505 099 419	.850 082 322	.935 787 967
.684	.352 367 560	.385 343 802	.504 594 572	.849 737 259	.935 552 116
.685	.351 291 147	.384 606 998	.504 090 230	.849 392 037	.935 315 812
.686	.350 218 945	.383 872 004	.503 586 391	.849 046 656	.935 079 053
.687	.349 150 934	.383 138 814	.503 083 057	.848 701 116	.934 841 840
.688	.348 087 090	.382 407 423	.502 580 225	.848 355 420	.934 604 174
.689	.347 027 396	.381 677 823	.502 077 896	.848 009 565	.934 366 054
.690	.345 971 829	.380 950 010	.501 576 069	.847 663 557	.934 127 480
.691	.344 920 369	.380 223 978	.501 074 744	.847 317 392	.933 888 453
.692	.343 872 996	.379 499 720	.500 573 919	.846 971 072	.933 648 973
.693	.342 829 689	.378 777 231	.500 073 596	.846 624 598	.933 409 039
.694	.341 790 430	.378 056 504	.499 573 772	.846 277 970	.933 168 653
.695	.340 755 196	.377 337 535	.499 074 448	.845 931 189	.932 927 814
.696	.339 723 969	.376 620 317	.498 575 623	.845 584 257	.932 686 522
.697	.338 696 729	.375 904 844	.498 077 297	.845 237 172	.932 444 778
.698	.337 673 456	.375 191 112	.497 579 468	.844 889 937	.932 202 581
.699	.336 654 131	.374 479 113	.497 082 137	.844 542 552	.931 959 933
.700	.335 638 734	.373 768 843	.496 585 304	.844 195 016	.931 716 832

TABLE I

x	$\int_x^\infty \frac{e^{-x}}{x^2}dx$	$\int_x^\infty \frac{e^{-x}}{x}dx$	$\int_x^\infty e^{-x}\,dx$	$\int_x^\infty xe^{-x}\,dx$	$\int_x^\infty x^2e^{-x}\,dx$
.700	0.335 638 734	0.373 768 843	0.496 585 304	0.844 195 016	1.931 716 832
.701	.334 627 246	.373 060 296	.496 088 967	.843 847 332	.931 473 279
.702	.333 619 647	.372 353 467	.495 593 126	.843 499 500	.931 229 275
.703	.332 615 920	.371 648 348	.495 097 780	.843 151 520	.930 984 819
.704	.331 616 044	.370 944 936	.494 602 930	.842 803 393	.930 739 911
.705	.330 620 002	.370 243 224	.494 108 574	.842 455 119	.930 494 552
.706	.329 627 773	.369 543 208	.493 614 713	.842 106 700	.930 248 743
.707	.328 639 342	.368 844 880	.493 121 345	.841 758 134	.930 002 482
.708	.327 654 686	.368 148 237	.492 628 470	.841 409 425	.929 755 770
.709	.326 673 790	.367 453 273	.492 136 088	.841 060 573	.929 508 608
.710	.325 696 635	.366 759 981	.491 644 197	.840 711 578	.929 260 995
.711	.324 723 202	.366 068 358	.491 152 799	.840 362 438	.929 012 932
.712	.323 753 473	.365 378 397	.490 661 892	.840 013 159	.928 764 419
.713	.322 787 433	.364 690 092	.490 171 475	.839 663 737	.928 515 456
.714	.321 825 059	.364 003 440	.489 681 549	.839 314 174	.928 266 043
.715	.320 866 339	.363 318 433	.489 192 112	.838 964 472	.928 016 181
.716	.319 911 251	.362 635 068	.488 703 164	.838 614 630	.927 765 869
.717	.318 959 779	.361 953 339	.488 214 705	.838 264 648	.927 515 108
.718	.318 011 906	.361 273 240	.487 726 735	.837 914 530	.927 263 897
.719	.317 067 614	.360 594 767	.487 239 252	.837 564 274	.927 012 238
.720	.316 126 886	.359 917 914	.486 752 256	.837 213 880	.926 760 130
.721	.315 189 705	.359 242 676	.486 265 747	.836 863 351	.926 507 573
.722	.314 256 056	.358 569 047	.485 779 724	.836 512 685	.926 254 568
.723	.313 325 918	.357 897 024	.485 294 187	.836 161 885	.926 001 115
.724	.312 399 278	.357 226 600	.484 809 136	.835 810 950	.925 747 214
.725	.311 476 118	.356 557 770	.484 324 569	.835 459 882	.925 492 864
.726	.310 556 421	.355 890 530	.483 840 486	.835 108 680	.925 238 068
.727	.309 640 170	.355 224 875	.483 356 888	.834 757 345	.924 982 823
.728	.308 727 351	.354 560 798	.482 873 773	.834 405 878	.924 727 131
.729	.307 817 945	.353 898 297	.482 391 140	.834 054 281	.924 470 992
.730	.306 911 937	.353 237 364	.481 908 990	.833 702 553	.924 214 407
.731	.306 009 312	.352 577 996	.481 427 322	.833 350 694	.923 957 374
.732	.305 110 051	.351 920 188	.480 946 135	.832 998 706	.923 699 895
.733	.304 214 142	.351 263 934	.480 465 430	.832 646 589	.923 441 969
.734	.303 321 566	.350 609 230	.479 985 204	.832 294 344	.923 183 597
.735	.302 432 309	.349 956 071	.479 505 459	.831 941 971	.922 924 779
.736	.301 546 354	.349 304 452	.479 026 193	.831 589 471	.922 665 515
.737	.300 663 687	.348 654 368	.478 547 406	.831 236 845	.922 405 806
.738	.299 784 292	.348 005 814	.478 069 098	.830 884 093	.922 145 651
.739	.298 908 153	.347 358 786	.477 591 268	.830 531 215	.921 885 051
.740	.298 035 255	.346 713 279	.477 113 916	.830 178 213	.921 624 006
.741	.297 165 584	.346 069 288	.476 637 040	.829 825 087	.921 362 516
.742	.296 299 124	.345 426 808	.476 160 641	.829 471 837	.921 100 582
.743	.295 435 860	.344 785 834	.475 684 719	.829 118 465	.920 838 202
.744	.294 575 776	.344 146 363	.475 209 272	.828 764 970	.920 575 379
.745	.293 718 860	.343 508 388	.474 734 300	.828 411 352	.920 312 112
.746	.292 865 094	.342 871 907	.474 259 803	.828 057 616	.920 048 400
.747	.292 014 466	.342 236 913	.473 785 780	.827 703 757	.919 784 245
.748	.291 166 961	.341 603 402	.473 312 231	.827 349 780	.919 519 647
.749	.290 322 563	.340 971 370	.472 839 156	.826 995 683	.919 254 605
.750	.289 481 257	.340 340 813	.472 366 553	.826 641 467	.918 989 121

TABLE I.

x	$\int_x^\infty \frac{e^{-x}}{x^2}dx$	$\int_x^\infty \frac{e^{-x}}{x}dx$	$\int_x^\infty e^{-x}\,dx$	$\int_x^\infty xe^{-x}\,dx$	$\int_x^\infty x^2e^{-x}\,dx$
.750	0.289 481 257	0.340 340 813	0.472 366 553	0.826 641 467	1.918 989 121
.751	.288 643 032	.339 711 725	.471 894 422	.826 287 133	.918 723 193
.752	.287 807 871	.339 084 102	.471 422 764	.825 932 681	.918 456 823
.753	.286 975 761	.338 457 940	.470 951 577	.825 578 114	.918 190 010
.754	.286 146 688	.337 833 233	.470 480 860	.825 223 429	.917 922 755
.755	.285 320 638	.337 209 978	.470 010 615	.824 868 629	.917 655 058
.756	.284 497 595	.336 588 171	.469 540 839	.824 513 713	.917 386 920
.757	.283 677 549	.335 967 805	.469 071 533	.824 158 683	.917 118 339
.758	.282 860 483	.335 348 878	.468 602 696	.823 803 538	.916 849 318
.759	.282 046 385	.334 731 385	.468 134 327	.823 448 282	.916 579 855
.760	.281 235 241	.334 115 321	.467 666 427	.823 092 912	.916 309 952
.761	.280 427 037	.333 500 682	.467 198 994	.822 737 429	.916 039 607
.762	.279 621 760	.332 887 464	.466 732 029	.822 381 835	.915 768 822
.763	.278 819 397	.332 275 662	.466 265 530	.822 026 130	.915 497 597
.764	.278 019 933	.331 665 273	.465 799 498	.821 670 314	.915 225 931
.765	.277 223 357	.331 056 291	.465 333 931	.821 314 388	.914 953 826
.766	.276 429 656	.330 448 712	.464 868 830	.820 958 353	.914 681 281
.767	.275 638 815	.329 842 532	.464 404 193	.820 602 209	.914 408 297
.768	.274 850 821	.329 237 748	.463 940 021	.820 245 957	.914 134 874
.769	.274 065 663	.328 634 354	.463 476 313	.819 889 598	.913 861 011
.770	.273 283 327	.328 032 346	.463 013 068	.819 533 131	.913 586 710
.771	.272 503 800	.327 431 721	.462 550 287	.819 176 558	.913 311 970
.772	.271 727 070	.326 832 474	.462 087 968	.818 819 879	.913 036 792
.773	.270 953 123	.326 234 601	.461 626 111	.818 463 094	.912 761 176
.774	.270 181 948	.325 638 097	.461 164 715	.818 106 205	.912 485 122
.775	.269 413 533	.325 042 959	.460 703 781	.817 749 211	.912 208 631
.776	.268 647 863	.324 449 183	.460 243 307	.817 392 114	.911 931 702
.777	.267 884 927	.323 856 764	.459 783 294	.817 034 913	.911 654 336
.778	.267 124 714	.323 265 698	.459 323 741	.816 677 611	.911 376 533
.779	.266 367 210	.322 675 982	.458 864 647	.816 320 206	.911 098 294
.780	.265 612 404	.322 087 610	.458 406 011	.815 962 700	.910 819 618
.781	.264 860 284	.321 500 580	.457 947 834	.815 605 093	.910 540 505
.782	.264 110 836	.320 914 887	.457 490 115	.815 247 386	.910 260 957
.783	.263 364 049	.320 330 528	.457 032 854	.814 889 579	.909 980 974
.784	.262 619 913	.319 747 497	.456 576 050	.814 531 672	.909 700 553
.785	.261 878 415	.319 165 791	.456 119 702	.814 173 668	.909 419 699
.786	.261 139 542	.318 585 407	.455 663 810	.813 815 565	.909 138 409
.787	.260 403 284	.318 006 340	.455 208 374	.813 457 364	.908 856 684
.788	.259 669 629	.317 428 586	.454 753 393	.813 099 066	.908 574 525
.789	.258 938 564	.316 852 142	.454 298 867	.812 740 673	.908 291 931
.790	.258 210 079	.316 277 004	.453 844 795	.812 382 184	.908 008 904
.791	.257 484 162	.315 703 167	.453 391 177	.812 023 599	.907 725 442
.792	.256 760 802	.315 130 628	.452 938 013	.811 664 919	.907 441 547
.793	.256 039 989	.314 559 382	.452 485 301	.811 306 145	.907 157 219
.794	.255 321 708	.313 989 428	.452 033 042	.810 947 277	.906 872 458
.795	.254 605 952	.313 420 759	.451 581 235	.810 588 317	.906 587 263
.796	.253 892 707	.312 853 373	.451 129 879	.810 229 263	.906 301 636
.797	.253 181 962	.312 287 266	.450 678 975	.809 870 118	.906 015 578
.798	.252 473 709	.311 722 433	.450 228 521	.809 510 881	.905 729 086
.799	.251 767 934	.311 158 872	.449 778 518	.809 151 554	.905 442 163
.800	.251 064 627	.310 596 578	.449 328 964	.808 792 135	.905 154 808

TABLE I

x	$\int_x^\infty \frac{e^{-x}}{x^2} dx$	$\int_x^\infty \frac{e^{-x}}{x} dx$	$\int_x^\infty e^{-x}\, dx$	$\int_x^\infty x e^{-x}\, dx$	$\int_x^\infty x^2 e^{-x}\, dx$
.800	0.251 064 627	0.310 596 578	0.449 328 964	0.808 792 135	1.905 154 808
.801	.250 363 777	.310 035 549	.448 879 860	.808 432 627	.904 867 022
.802	.249 665 373	.309 475 779	.448 431 204	.808 073 030	.904 578 804
.803	.248 969 406	.308 917 265	.447 982 997	.807 713 344	.904 290 156
.804	.248 275 864	.308 360 004	.447 535 238	.807 353 570	.904 001 078
.805	.247 584 737	.307 803 992	.447 087 927	.806 993 708	.903 711 568
.806	.246 896 013	.307 249 225	.446 641 062	.806 633 758	.903 421 629
.807	.246 209 683	.306 695 700	.446 194 644	.806 273 722	.903 131 260
.808	.245 525 736	.306 143 413	.445 748 673	.805 913 600	.902 840 462
.809	.244 844 162	.305 592 361	.445 303 147	.805 553 393	.902 549 234
.810	.244 164 950	.305 042 539	.444 858 066	.805 193 100	.902 257 577
.811	.243 488 091	.304 493 944	.444 413 431	.804 832 723	.901 965 491
.812	.242 813 573	.303 946 574	.443 969 239	.804 472 261	.901 672 977
.813	.242 141 387	.303 400 423	.443 525 492	.804 111 717	.901 380 034
.814	.241 471 523	.302 855 489	.443 082 188	.803 751 088	.901 086 664
.815	.240 803 971	.302 311 768	.442 639 327	.803 390 379	.900 792 866
.816	.240 138 721	.301 769 256	.442 196 909	.803 029 587	.900 498 640
.817	.239 475 762	.301 227 951	.441 754 933	.802 668 714	.900 203 987
.818	.238 815 085	.300 687 848	.441 313 399	.802 307 760	.899 908 907
.819	.238 156 680	.300 148 944	.440 872 306	.801 946 726	.899 613 400
.820	.237 500 539	.299 611 235	.440 431 655	.801 585 611	.899 317 467
.821	.236 846 649	.299 074 719	.439 991 443	.801 224 418	.899 021 108
.822	.236 195 002	.298 539 392	.439 551 671	.800 863 145	.898 724 322
.823	.235 545 589	.298 005 249	.439 112 340	.800 501 795	.898 427 112
.824	.234 898 399	.297 472 289	.438 673 447	.800 140 367	.898 129 475
.825	.234 253 423	.296 940 507	.438 234 992	.799 778 861	.897 831 414
.826	.233 610 653	.296 409 900	.437 796 977	.799 417 279	.897 532 927
.827	.232 970 077	.295 880 465	.437 359 398	.799 055 621	.897 234 018
.828	.232 331 688	.295 352 198	.436 922 258	.798 693 887	.896 934 683
.829	.231 695 475	.294 825 096	.436 485 554	.798 332 078	.896 634 924
.830	.231 061 431	.294 299 155	.436 049 286	.797 970 194	.896 334 741
.831	.230 429 544	.293 774 373	.435 613 455	.797 608 236	.896 034 135
.832	.229 799 806	.293 250 746	.435 178 059	.797 246 205	.895 733 106
.833	.229 172 208	.292 728 271	.434 743 099	.796 884 100	.895 431 654
.834	.228 546 741	.292 206 944	.434 308 573	.796 521 923	.895 129 779
.835	.227 923 394	.291 686 763	.433 874 481	.796 159 673	.894 827 482
.836	.227 302 162	.291 167 723	.433 440 824	.795 797 352	.894 524 763
.837	.226 683 033	.290 649 822	.433 007 600	.795 434 959	.894 221 622
.838	.226 065 999	.290 133 056	432 574 808	.795 072 498	.893 918 060
.839	.225 451 051	.289 617 423	.432 142 450	.794 709 965	.893 614 076
.840	.224 838 181	.289 102 918	.431 710 523	.794 347 363	.893 309 672
.841	.224 227 380	.288 589 539	.431 279 029	.793 984 692	.893 004 846
.842	.223 618 638	.288 077 283	.430 847 965	.793 621 952	.892 699 601
.843	.223 011 946	.287 566 147	.430 417 333	.793 259 144	.892 393 935
.844	.222 407 299	.287 056 126	.429 987 130	.792 896 268	.892 087 850
.845	.221 804 684	.286 547 219	.429 557 358	.792 533 326	.891 781 344
.846	.221 204 096	.286 039 421	.429 128 016	.792 170 317	.891 474 420
.847	.220 605 524	.285 532 731	.428 699 102	.791 807 241	.891 167 077
.848	.220 008 961	.285 027 144	.428 270 617	.791 444 101	.890 859 315
.849	.219 414 399	.284 522 657	.427 842 561	.791 080 894	.890 551 135
.850	.218 821 828	.284 019 268	.427 414 932	.790 717 624	.890 242 537

TABLE I

x	$\int_x^\infty \frac{e^{-x}}{x^2}dx$	$\int_x^\infty \frac{e^{-x}}{x}dx$	$\int_x^\infty e^{-x}\,dx$	$\int_x^\infty xe^{-x}\,dx$	$\int_x^\infty x^2e^{-x}\,dx$
.850	0.218 821 828	0.284 019 268	0.427 414 932	0.790 717 624	1.890 242 537
.851	.218 231 241	.283 516 974	.426 987 731	.790 354 290	.889 933 520
.852	.217 642 628	.283 015 771	.426 560 956	.789 990 891	.889 624 087
.853	.217 055 984	.282 515 656	.426 134 609	.789 627 430	.889 314 236
.854	.216 471 297	.282 016 627	.425 708 687	.789 263 906	.889 003 968
.855	.215 888 562	.281 518 679	.425 283 191	.788 900 319	.888 693 284
.856	.215 307 769	.281 021 811	.424 858 120	.788 536 672	.888 382 183
.857	.214 728 911	.280 526 019	.424 433 475	.788 172 963	.888 070 666
.858	.214 151 979	.280 031 300	.424 009 253	.787 809 193	.887 758 734
.859	.213 576 965	.279 537 652	.423 585 456	.787 445 363	.887 446 385
.860	.213 003 863	.279 045 070	.423 162 082	.787 081 473	.887 133 622
.861	.212 432 663	.278 553 553	.422 739 132	.786 717 524	.886 820 444
.862	.211 863 358	.278 063 097	.422 316 604	.786 353 516	.886 506 852
.863	.211 295 940	.277 573 699	.421 894 498	.785 989 451	.886 192 845
.864	.210 730 402	.277 085 356	.421 472 815	.785 625 327	.885 878 424
.865	.210 166 735	.276 598 066	.421 051 553	.785 261 145	.885 563 589
.866	.209 604 931	.276 111 826	.420 630 712	.784 896 908	.885 248 341
.867	.209 044 984	.275 626 632	.420 210 291	.784 532 613	.884 932 680
.868	.208 486 885	.275 142 482	.419 790 291	.784 168 263	.884 616 607
.869	.207 930 628	.274 659 372	.419 370 710	.783 803 858	.884 300 120
.870	.207 376 204	.274 177 301	.418 951 549	.783 439 397	.883 983 222
.871	.206 823 606	.273 696 264	.418 532 807	.783 074 882	.883 665 912
.872	.206 272 827	.273 216 260	.418 114 483	.782 710 313	.883 348 190
.873	.205 723 858	.272 737 285	.417 696 578	.782 345 690	.883 030 056
.874	.205 176 693	.272 259 337	.417 279 090	.781 981 015	.882 711 512
.875	.204 631 325	.271 782 412	.416 862 020	.781 616 287	.882 392 558
.876	.204 087 744	.271 306 509	.416 445 366	.781 251 507	.882 073 193
.877	.203 545 947	.270 831 623	.416 029 129	.780 886 675	.881 753 417
.878	.203 005 924	.270 357 752	.415 613 308	.780 521 792	.881 433 232
.879	.202 467 667	.269 884 895	.415 197 902	.780 156 858	.881 112 638
.880	.201 931 172	.269 413 046	.414 782 912	.779 791 874	.880 791 635
.881	.201 396 428	.268 942 205	.414 368 336	.779 426 840	.880 470 222
.882	.200 863 431	.268 472 368	.413 954 175	.779 061 757	.880 148 402
.883	.200 332 173	.268 003 532	.413 540 428	.778 696 625	.879 826 173
.884	.199 802 645	.267 535 696	.413 127 094	.778 331 445	.879 503 536
.885	.199 274 844	.267 068 855	.412 714 173	.777 966 217	.879 180 492
.886	.198 748 760	.266 603 007	.412 301 665	.777 600 941	.878 857 040
.887	.198 224 386	.266 138 150	.411 889 570	.777 235 618	.878 533 181
.888	.197 701 717	.265 674 281	.411 477 886	.776 870 249	.878 208 916
.889	.197 180 744	265 211 398	.411 066 614	.776 504 834	.877 884 245
.890	.196 661 462	.264 749 496	.410 655 753	.776 139 373	.877 559 167
.891	.196 143 863	.264 288 575	.410 245 302	.775 773 867	.877 233 684
.892	.195 627 941	.263 828 631	.409 835 262	.775 408 316	.876 907 795
.893	.195 113 689	.263 369 661	.409 425 632	.775 042 721	.876 581 502
.894	.194 601 101	.262 911 663	.409 016 411	.774 677 082	.876 254 803
.895	.194 090 169	.262 454 634	.408 607 599	.774 311 399	.875 927 701
.896	.193 580 887	.261 998 572	.408 199 195	.773 945 674	.875 600 194
.897	.193 073 248	.261 543 475	.407 791 200	.773 579 907	.875 272 283
.898	.192 567 246	.261 089 338	.407 383 613	.773 214 097	.874 943 969
.899	.192 062 874	.260 636 161	.406 976 433	.772 848 246	.874 615 252
.900	.191 560 127	.260 183 939	.406 569 660	.772 482 353	.874 286 132

TABLE I

x	$\int_x^\infty \frac{e^{-x}}{x^2}dx$	$\int_x^\infty \frac{e^{-x}}{x}dx$	$\int_x^\infty e^{-x}\,dx$	$\int_x^\infty xe^{-x}\,dx$	$\int_x^\infty x^2e^{-x}\,dx$
.900	0.191 560 127	0.260 183 939	0.406 569 660	0.772 482 353	1.874 286 132
.901	.191 058 996	.259 732 672	.406 163 293	.772 116 421	.873 956 609
.902	.190 559 478	.259 282 355	.405 757 333	.771 750 447	.873 626 685
.903	.190 061 563	.258 832 987	.405 351 778	.771 384 434	.873 296 357
.904	.189 565 246	.258 384 565	.404 946 629	.771 018 382	.872 965 629
.905	.189 070 521	.257 937 087	.404 541 885	.770 652 291	.872 634 500
.906	.188 577 382	.257 490 549	.404 137 545	.770 286 162	.872 302 969
.907	.188 085 822	.257 044 950	.403 733 610	.769 919 994	.871 971 039
.908	.187 595 834	.256 600 287	.403 330 078	.769 553 789	.871 638 707
.909	.187 107 414	.256 156 557	.402 926 950	.769 187 547	.871 305 976
.910	.186 620 554	.255 713 758	.402 524 224	.768 821 268	.870 972 846
.911	.186 135 249	.255 271 887	.402 121 901	.768 454 953	.870 639 316
.912	.185 651 492	.254 830 942	.401 719 980	.768 088 602	.870 305 387
.913	.185 169 277	.254 390 921	.401 318 461	.767 722 216	.869 971 060
.914	.184 688 598	.253 951 821	.400 917 343	.767 355 795	.869 636 334
.915	.184 209 449	.253 513 640	.400 516 626	.766 989 339	.869 301 210
.916	.183 731 824	.253 076 374	.400 116 310	.766 622 849	.868 965 689
.917	.183 255 717	.252 640 023	.399 716 393	.766 256 326	.868 629 770
.918	.182 781 123	.252 204 582	.399 316 877	.765 889 770	.868 293 455
.919	.182 308 033	.251 770 051	.398 917 759	.765 523 180	.867 956 743
.920	.181 836 446	.251 336 425	.398 519 041	.765 156 559	.867 619 634
.921	.181 366 352	.250 903 704	.398 120 721	.764 789 905	.867 282 130
.922	.180 897 747	.250 471 884	.397 722 800	.764 423 221	.866 944 230
.923	.180 430 624	.250 040 964	.397 325 276	.764 056 505	.866 605 934
.924	.179 964 979	.249 610 940	.396 928 149	.763 689 758	.866 267 244
.925	.179 500 804	.249 181 811	.396 531 419	.763 322 982	.865 928 159
.926	.179 038 095	.248 753 574	.396 135 086	.762 956 175	.865 588 680
.927	.178 576 846	.248 326 227	.395 739 149	.762 589 340	.865 248 806
.928	.178 117 051	.247 899 767	.395 343 607	.762 222 475	.864 908 539
.929	.177 658 704	.247 474 193	.394 948 461	.761 855 581	.864 567 879
.930	.177 201 800	.247 049 501	.394 553 710	.761 488 661	.864 226 826
.931	.176 746 334	.246 625 689	.394 159 354	.761 121 712	.863 885 380
.932	.176 292 299	.246 202 756	.393 765 392	.760 754 736	.863 543 542
.933	.175 839 691	.245 780 698	.393 371 823	.760 387 734	.863 201 312
.934	.175 388 503	.245 359 514	.392 978 648	.760 020 705	.862 858 691
.935	.174 938 729	.244 939 202	.392 585 866	.759 653 649	.862 515 678
.936	.174 490 366	.244 519 758	.392 193 476	.759 286 569	.862 172 274
.937	.174 043 406	.244 101 181	.391 801 478	.758 919 464	.861 828 480
.938	.173 597 846	.243 683 468	.391 409 873	.758 552 333	.861 484 295
.939	.173 153 680	.243 266 617	.391 018 659	.758 185 179	.861 139 721
.940	.172 710 900	.242 850 627	.390 627 835	.757 818 001	.860 794 757
.941	.172 269 505	.242 435 493	.390 237 403	.757 450 799	.860 449 403
.942	.171 829 485	.242 021 216	.389 847 360	.757 083 574	.860 103 661
.943	.171 390 839	.241 607 791	.389 457 708	.756 716 326	.859 757 530
.944	.170 953 558	.241 195 218	.389 068 445	.756 349 057	.859 411 011
.945	.170 517 640	.240 783 493	.388 679 571	.755 981 765	.859 064 105
.946	.170 083 078	.240 372 615	.388 291 086	.755 614 453	.858 716 810
.947	.169 649 867	.239 962 581	.387 902 989	.755 247 119	.858 369 129
.948	.169 218 003	.239 553 389	.387 515 279	.754 879 764	.858 021 061
.949	.168 787 478	.239 145 038	.387 127 958	.754 512 390	.857 672 606
.950	.168 358 290	.238 737 524	.386 741 023	.754 144 996	.857 323 765

TABLE I

x	$\int_x^\infty \frac{e^{-x}}{x^2}dx$	$\int_x^\infty \frac{e^{-x}}{x}dx$	$\int_x^\infty e^{-x}\,dx$	$\int_x^\infty xe^{-x}\,dx$	$\int_x^\infty x^2e^{-x}\,dx$
.950	0.168 358 290	0.238 737 524	0.386 741 023	0.754 144 996	1.857 323 765
.951	.167 930 433	.238 330 845	.386 354 476	.753 777 582	.856 974 539
.952	.167 503 902	.237 925 000	.385 968 314	.753 410 150	.856 624 927
.953	.167 078 690	.237 519 987	.385 582 539	.753 042 699	.856 274 929
.954	.166 654 795	.237 115 802	.385 197 149	.752 675 230	.855 924 548
.955	.166 232 209	.236 712 445	.384 812 145	.752 307 743	.855 573 781
.956	.165 810 930	.236 309 912	.384 427 525	.751 940 238	.855 222 631
.957	.165 390 951	.235 908 202	.384 043 289	.751 572 717	.854 871 097
.958	.164 972 267	.235 507 313	.383 659 438	.751 205 180	.854 519 180
.959	.164 554 874	.235 107 243	.383 275 970	.750 837 625	.854 166 880
.960	.164 138 768	.234 707 988	.382 892 886	.750 470 057	.853 814 197
.961	.163 723 943	.234 309 548	.382 510 184	.750 102 472	.853 461 132
.962	.163 310 393	.233 911 920	.382 127 865	.749 734 872	.853 107 684
.963	.162 898 115	.233 515 103	.381 745 929	.749 367 258	.852 753 856
.964	.162 487 104	.233 119 093	.381 364 373	.748 999 630	.852 399 646
.965	.162 077 353	.232 723 890	.380 983 200	.748 631 986	.852 045 055
.966	.161 668 861	.232 329 490	.380 602 407	.748 264 332	.851 690 084
.967	.161 261 620	.231 935 893	.380 221 995	.747 896 664	.851 334 732
.968	.160 855 627	.231 543 095	.379 841 963	.747 528 983	.850 979 001
.969	.160 450 878	.231 151 094	.379 462 311	.747 161 290	.850 622 890
.970	.160 047 366	.230 759 890	.379 083 038	.746 793 585	.850 266 401
.971	.159 645 088	.230 369 479	.378 704 145	.746 425 869	.849 909 532
.972	.159 244 039	.229 979 860	.378 325 630	.746 058 142	.849 552 285
.973	.158 844 214	.229 591 031	.377 947 493	.745 690 404	.849 194 660
.974	.158 445 609	.229 202 989	.377 569 735	.745 322 656	.848 836 658
.975	.158 048 219	.228 815 733	.377 192 354	.744 954 898	.848 478 278
.976	.157 652 050	.228 429 251	.376 815 350	.744 587 130	.848 119 521
.977	.157 257 067	.228 043 570	.376 438 723	.744 219 355	.847 760 387
.978	.156 863 297	.227 658 658	.376 062 472	.743 851 570	.847 400 878
.979	.156 470 723	.227 274 525	.375 686 598	.743 483 777	.847 040 992
.980	.156 079 342	.226 891 167	.375 311 099	.743 115 976	.846 680 731
.981	.155 689 149	.226 508 583	.374 935 975	.742 748 167	.846 320 094
.982	.155 300 140	.226 126 771	.374 561 227	.742 380 352	.845 959 083
.983	.154 912 310	.225 745 729	.374 186 853	.742 012 529	.845 597 698
.984	.154 525 657	.225 365 454	.373 812 853	.741 644 700	.845 235 938
.985	.154 140 173	.224 985 946	.373 439 227	.741 276 865	.844 873 805
.986	.153 765 998	.224 607 201	.373 065 974	.740 909 025	.844 511 298
.987	.153 372 701	.224 229 219	.372 693 095	.740 541 179	.844 148 419
.988	.152 990 703	.223 851 997	.372 320 588	.740 173 329	.843 785 166
.989	.152 609 860	.223 475 533	.371 948 454	.739 805 474	.843 421 542
.990	.152 230 165	.223 099 826	.371 576 691	.739 437 615	.843 057 545
.991	.151 851 615	.222 724 873	.371 205 300	.739 069 752	.842 693 177
.992	.151 474 207	.222 350 672	.370 834 280	.738 701 886	.842 328 438
.993	.151 097 935	.221 977 222	.370 463 631	.738 334 017	.841 963 328
.994	.150 722 796	.221 604 521	.370 093 353	.737 966 146	.841 597 847
.995	.150 348 784	.221 232 567	.369 723 445	.737 598 272	.841 231 997
.996	.149 975 897	.220 861 358	.369 353 906	.737 230 396	.840 865 777
.997	.149 604 130	.220 490 892	.368 984 737	.736 862 519	.840 499 187
.998	.149 233 479	.220 121 167	.368 615 936	.736 494 641	.840 132 228
.999	.148 863 939	.219 752 182	.368 247 505	.736 126 762	.839 764 901
1.000	.148 495 507	.219 383 934	.367 879 441	.735 758 882	.839 397 206

TABLE II.

x	$\int_x^\infty \frac{e^{-x}}{x^2}\,dx$	$\int_x^\infty \frac{e^{-x}}{x}\,dx$	$\int_x^\infty e^{-x}\,dx$	$\int_x^\infty xe^{-x}\,dx$	$\int_x^\infty x^2e^{-x}\,dx$
1.00	0.148 495 507	0.219 383 934	0.367 879 441	0.735 758 882	1.839 397 206
1.01	.144 871 228	.215 741 623	.364 218 980	.732 080 149	.835 700 079
1.02	.141 353 368	.212 171 083	.360 594 940	.728 401 779	.831 966 534
1.03	.137 938 141	.208 670 559	.357 006 961	.724 724 130	.828 196 944
1.04	.134 621 920	.205 238 351	.353 454 682	.721 047 551	.824 391 686
1.05	.131 401 234	.201 872 813	.349 937 749	.717 372 386	.820 551 140
1.06	.128 272 758	.198 572 346	.346 455 810	.713 698 969	.816 675 687
1.07	.125 233 305	.195 335 403	.343 008 517	.710 027 631	.812 765 714
1.08	.122 279 823	.192 160 479	.339 595 526	.706 358 693	.808 821 608
1.09	.119 409 381	.189 046 118	.336 216 494	.702 692 472	.804 843 760
1.10	.116 619 171	.185 990 905	.332 871 084	.699 029 276	.800 832 563
1.11	.113 906 500	.182 993 465	.329 558 961	.695 369 408	.796 788 412
1.12	.111 268 778	.180 052 467	.326 279 795	.691 713 165	.792 711 704
1.13	.108 703 523	.177 166 615	.323 033 256	.688 060 836	.788 602 837
1.14	.106 208 351	.174 334 651	.319 819 022	.684 412 707	.784 462 214
1.15	.103 780 967	.171 555 354	.316 636 769	.680 769 054	.780 290 236
1.16	.101 419 173	.168 827 535	.313 486 181	.677 130 151	.776 087 306
1.17	.099 120 850	.166 150 040	.310 366 941	.673 496 263	.771 853 831
1.18	.096 883 963	.163 521 748	.307 278 739	.669 867 650	.767 590 216
1.19	.094 706 554	.160 941 567	.304 221 264	.666 244 568	.763 296 869
1.20	092 586 740	.158 408 437	.301 194 212	.662 627 266	.758 974 198
1.21	.090 522 708	.155 921 325	.298 197 279	.659 015 988	.754 622 612
1.22	.088 512 714	.153 479 226	.295 230 167	.655 410 971	.750 242 522
1.23	.086 555 078	.151 081 164	.292 292 578	.651 812 448	.745 834 337
1.24	.084 648 181	.148 726 188	.289 384 218	.648 220 648	.741 398 470
1.25	.082 790 464	.146 413 373	.286 504 797	.644 635 793	.736 935 331
1.26	.080 980 428	.144 141 815	.283 654 027	.641 058 100	.732 445 332
1.27	.079 216 622	.141 910 639	.280 831 622	.637 487 781	.727 928 886
1.28	.077 497 652	.139 718 989	.278 037 300	.633 925 045	.723 386 403
1.29	.075 822 172	.137 566 032	.275 270 783	.630 370 093	.718 818 297
1.30	.074 188 883	.135 450 958	.272 531 793	.626 823 124	.714 224 978
1.31	.072 596 534	.133 372 975	.269 820 056	.632 284 330	.709 606 859
1.32	.071 043 915	.131 331 314	.267 135 302	.619 753 901	.704 964 351
1.33	.069 529 860	.129 325 224	.264 477 261	.616 232 019	.700 297 865
1.34	.068 053 243	.127 353 972	.261 845 669	.612 718 864	.695 607 811
1.35	.066 612 979	.125 416 844	.259 240 261	.609 214 613	.690 894 600
1.36	.065 208 014	.123 513 146	.256 660 777	.605 719 434	.686 158 640
1.37	.063 837 335	.121 642 198	.254 106 960	.602 233 494	.681 400 341
1.38	.062 499 961	.119 803 338	.251 578 553	.598 756 956	.676 620 109
1.39	.061 194 948	.117 995 919	.249 075 305	.595 289 978	.671 818 352
1.40	.059 921 376	.116 219 313	.246 596 964	.591 832 713	.666 995 476
1.41	.058 678 362	.114 472 903	.244 143 283	.588 385 312	.662 151 886
1.42	.057 465 049	.112 756 090	.241 714 017	.584 947 921	.657 287 985
1.43	.056 280 610	.111 068 287	.239 308 922	.581 520 681	.652 404 177
1.44	.055 124 243	.109 408 923	.236 927 759	.578 103 731	.647 500 863
1.45	.053 995 172	.107 777 440	.234 570 288	.574 697 206	.642 578 442
1.46	.052 892 650	.106 173 292	.232 236 275	.571 301 236	.637 637 315
1.47	.051 815 949	.104 595 946	.229 925 485	.567 915 948	.632 677 878
1.48	.050 764 367	.103 044 882	.227 637 688	.564 541 467	.627 700 527
1.49	.049 737 223	.101 519 593	.225 372 656	.561 177 912	.622 705 657
1 50	.048 733 858	.100 019 582	.223 130 160	.557 825 400	.617 693 661

TABLE II.

x	$\int_x^\infty \frac{e^{-x}}{x^2}dx$	$\int_x^\infty \frac{e^{-x}}{x}dx$	$\int_x^\infty e^{-x}\,dx$	$\int_x^\infty xe^{-x}\,dx$	$\int_x^\infty x^2e^{-x}\,dx$
1.50	0.048 733 858	0.100 019 582	0.223 130 160	0.557 825 400	1.617 693 661
1.51	.047 753 634	.098 544 365	.220 909 978	.554 484 045	.612 664 930
1.52	.046 795 933	.097 093 466	.218 711 887	.551 153 955	.607 619 854
1.53	.045 860 156	.095 666 424	.216 535 667	.547 835 238	.602 558 820
1.54	.044 945 721	.094 262 786	.214 381 101	.544 527 998	.597 482 215
1.55	.044 052 069	.092 882 108	.212 247 974	.541 232 333	.592 390 424
1.56	.043 178 651	.091 523 959	.210 136 071	.537 948 342	.587 283 827
1.57	.042 324 938	.090 187 917	.208 045 182	.534 676 119	.582 162 807
1.58	.041 490 420	.088 873 566	.205 975 098	.531 415 753	.577 027 742
1.59	.040 674 598	.087 580 504	.203 925 612	.528 167 334	.571 879 008
1.60	.039 876 990	.086 308 334	.201 896 518	.524 930 947	.566 716 980
1.61	.039 097 128	.085 056 670	.199 887 614	.521 706 673	.561 542 030
1.62	.038 334 558	.083 825 133	.197 898 699	.518 494 592	.556 354 529
1.63	.037 588 839	.082 613 354	.195 929 574	.515 294 780	.551 154 845
1.64	.036 859 544	.081 420 970	.193 980 042	.512 107 312	.545 943 345
1.65	.036 146 257	.080 247 627	.192 049 909	.508 932 258	.540 720 392
1.66	.035 448 576	.079 092 978	.190 138 980	.505 769 687	.535 486 348
1.67	.034 766 110	.077 956 684	.188 247 066	.502 619 665	.530 241 572
1.68	.034 098 477	.076 838 413	.186 373 976	.499 482 256	.524 986 422
1.69	.033 445 311	.075 737 839	.184 519 524	.496 357 520	.519 721 252
1.70	.032 806 253	.074 654 644	.182 683 524	.493 245 515	.514 446 414
1.71	.032 180 951	.073 588 518	.180 865 793	.490 146 298	.509 162 260
1.72	.031 569 070	.072 539 155	.179 066 148	.487 059 922	.503 869 137
1.73	.030 970 283	.071 506 255	.177 284 410	.483 986 439	.498 567 390
1.74	.030 384 266	.070 489 527	.175 520 401	.480 925 898	.493 257 360
1.75	.029 810 711	.069 488 685	.173 773 943	.477 878 344	.487 939 391
1.76	.029 249 317	.068 503 447	.172 044 864	.474 843 824	.482 613 818
1.77	.028 699 788	.067 533 539	.170 332 989	.471 822 379	.477 280 979
1.78	.028 161 841	.066 578 691	.168 638 147	.468 814 049	.471 941 205
1.79	.027 635 197	.065 638 641	.166 960 170	.465 818 873	.466 594 826
1.80	.027 119 587	.064 713 129	.165 298 888	.462 836 887	.461 242 172
1.81	.026 614 747	.063 801 903	.163 654 137	.459 868 124	.455 883 566
1.82	.026 120 423	.062 904 715	.162 025 751	.456 912 618	.450 519 333
1.83	.025 636 366	.062 021 321	.160 413 568	.453 970 397	.445 149 791
1.84	.025 162 336	.061 151 483	.158 817 426	.451 041 490	.439 775 258
1.85	.024 698 095	.060 294 968	.157 237 166	.448 125 924	.434 396 050
1.86	.024 243 418	.059 451 545	.155 672 630	.445 223 723	.429 012 478
1.87	.023 798 076	.058 620 994	.154 123 662	.442 334 909	.423 624 852
1.88	.023 361 859	.057 803 091	.152 590 106	.439 459 505	.418 233 479
1.89	.022 934 551	.056 997 623	.151 071 809	.436 597 528	.412 838 663
1.90	.022 515 948	.056 204 378	.149 568 619	.433 748 996	.407 440 707
1.91	.022 105 850	.055 423 148	.148 080 387	.430 913 925	.402 039 908
1.92	.021 704 062	.054 653 731	.146 606 962	.428 092 329	.396 636 564
1.93	.021 310 393	.053 895 927	.145 148 198	.425 284 222	.391 230 968
1.94	.020 924 661	.053 149 540	.143 703 950	.422 489 612	.385 823 410
1.95	.020 546 682	.052 414 380	.142 274 072	.419 708 511	.380 414 180
1.96	.020 176 284	.051 690 257	.140 858 421	.416 940 926	.375 003 562
1.97	.019 813 294	.050 976 988	.139 456 856	.414 186 863	.369 591 839
1.98	.019 457 546	.050 274 392	.138 069 237	.411 446 327	.364 179 292
1.99	.019 108 879	.049 582 290	.136 695 425	.408 719 322	.358 766 198
2.00	.018 767 131	.048 900 511	.135 335 283	.406 005 850	.353 352 832

TABLE III.

x	$\frac{e^{-x}-1}{x}$	x	$\frac{e^{-x}-1}{x}$	x	$\frac{e^{-x}}{x}$	x	$\frac{e^{-x}}{x}$
.000	1.000 000 000	.050	0.975 411 510	.100	9.048 374 180	.150	5.738 053 176
.001	0.999 500 167	.051	.974 928 029	.101	8.949 832 009	.151	.694 355 620
.002	.999 000 667	.052	.974 444 868	.102	.853 230 899	.152	.651 238 689
.003	.998 501 499	.053	.973 962 029	.103	.758 514 306	.153	.608 690 992
.004	.998 002 664	.054	.973 479 509	.104	.665 627 860	.154	.566 701 435
.005	.997 504 161	.055	.972 997 310	.105	.574 519 263	.155	.525 259 210
.006	.997 005 991	.056	.972 515 431	.106	.485 138 189	.156	.484 353 784
.007	.996 508 153	.057	.972 033 871	.107	.397 436 196	.157	.443 974 897
.008	.996 010 645	.058	.971 552 630	.108	.311 366 634	.158	.404 112 544
.009	.995 513 470	.059	.971 071 709	.109	.226 884 564	.159	.364 756 975
.010	.995 016 625	.060	.970 591 107	.110	.143 946 685	.160	.325 898 681
.011	.994 520 111	.061	.970 110 823	.111	.062 511 252	.161	.287 528 392
.012	.994 023 928	.062	.969 630 858	.112	7.982 538 013	.162	.249 637 065
.013	.993 528 076	.063	.969 151 211	.113	.903 988 142	.163	.212 215 880
.014	.993 032 553	.064	.968 671 882	.114	.826 824 174	.164	.175 256 231
.015	.992 537 360	.065	.968 192 871	.115	.751 009 947	.165	.138 749 722
.016	.992 042 497	.066	.967 714 177	.116	.676 510 546	.166	.102 688 158
.017	.991 547 963	.067	.967 235 801	.117	.603 292 249	.167	.067 063 541
.018	.991 053 758	.068	.966 757 742	.118	.531 322 480	.168	.031 868 064
.019	.990 559 882	.069	.966 279 999	.119	.460 569 754	.169	4.997 094 103
.020	.990 066 335	.070	.965 802 573	.120	.391 003 639	.170	.962 734 215
.021	989 573 116	.071	.965 325 463	.121	.322 594 707	.171	.928 781 131
.022	.989 080 225	.072	.964 848 669	.122	.255 314 496	.172	.895 227 751
.023	.988 587 662	.073	.964 372 191	.123	.189 135 468	.173	.862 067 138
.024	.988 095 427	.074	.963 896 029	.124	.124 030 975	.174	.829 292 515
.025	.987 603 519	.075	.963 420 182	.125	.059 975 221	.175	.796 897 262
.026	.987 111 938	.076	.962 944 651	.126	6.996 943 228	.176	.764 874 905
.027	.986 620 684	.077	.962 469 434	.127	.934 910 808	.177	.733 219 122
.028	.986 129 757	.078	.961 994 531	.128	.873 854 525	.178	.701 923 727
.029	.985 639 156	.079	.961 519 944	.129	.813 751 671	.179	.670 982 678
.030	.985 148 882	.080	.961 045 670	.130	.754 580 238	.180	.640 390 063
.031	.984 658 933	.081	.960 571 711	.131	.696 318 888	.181	.610 140 103
.032	.984 169 310	.082	.960 098 065	.132	.638 946 932	.182	.580 227 145
.033	.983 680 012	.083	.959 624 732	.133	.582 444 302	.183	.550 645 660
.034	.983 191 040	.084	.959 151 713	.134	.526 791 527	.184	.521 390 238
.035	.982 702 393	.085	.958 679 007	.135	.471 969 716	.185	.492 455 588
.036	.982 214 070	.086	.958 206 614	.136	.417 960 533	.186	.463 836 532
.037	.981 726 072	.087	.957 734 533	.137	.364 746 176	.187	.435 528 002
.038	.981 238 398	.088	.957 262 765	.138	.312 309 360	.188	.407 525 038
.039	.980 751 048	.089	.956 791 308	.139	.260 633 298	.189	.379 822 787
.040	.980 264 021	.090	.956 320 164	.140	.209 701 681	.190	.352 416 494
.041	.979 777 318	.091	.955 849 331	.141	.159 498 665	.191	.325 301 509
.042	.979 290 939	.092	.955 378 809	.142	.110 008 849	.192	.298 473 273
.043	.978 804 882	.093	.954 908 599	.143	.061 217 265	.193	.271 927 327
.044	.978 319 148	.094	.954 438 700	.144	.013 109 362	.194	.245 659 300
.045	.977 833 737	.095	.953 969 111	.145	5.965 670 987	.195	.219 664 913
.046	.977 348 648	.096	.953 499 833	.146	.918 888 378	.196	.193 939 973
.047	.976 863 881	.097	.953 030 865	.147	.872 748 146	.197	.168 480 372
.048	.976 379 436	.098	.952 562 207	.148	.827 237 263	.198	.143 282 087
.049	.975 895 310	.099	.952 093 858	.149	.782 343 053	.199	.118 341 173
.050	.975 411 510	.100	.951 625 820	.150	.738 053 176	.200	.093 653 765

TABLE III.

x	$\frac{e^{-x}}{x}$	x	$\frac{e^{-x}}{x}$	x	$\frac{e^{-x}}{x}$	x	$\frac{e^{-x}}{x}$
.200	4.093 653 765	.250	3.115 203 132	.300	2.469 394 069	.350	2.013 394 542
.201	.069 216 077	.251	.099 690 723	.301	.458 730 142	.351	.005 651 720
.202	.045 024 396	.252	.084 304 516	.302	.448 139 288	.352	1.997 954 892
.203	.021 075 081	.253	.069 043 011	.303	.437 620 780	.353	.990 303 664
.204	3.997 364 565	.254	.053 904 732	.304	.427 173 903	.354	.982 697 648
.205	.973 889 348	.255	.038 888 227	.305	.416 797 949	.355	.975 136 460
.206	.950 646 001	.256	.023 992 066	.306	.406 492 220	.356	.967 619 720
.207	.927 631 159	.257	.009 214 840	.307	.396 256 029	.357	.960 147 052
.208	.904 841 523	.258	2.994 555 163	.308	.386 088 695	.358	.952 718 087
.209	.882 273 855	.259	.980 011 672	.309	.375 989 547	.359	.945 332 455
.210	.859 924 981	.260	.965 583 022	.310	.365 957 923	.360	.937 989 795
.211	.837 791 786	.261	.951 267 891	.311	.355 993 170	.361	.930 689 746
.212	.815 871 215	.262	.937 064 976	.312	.346 094 642	.362	.923 431 955
.213	.794 160 269	.263	.922 972 994	.313	.336 261 701	.363	.916 216 070
.214	.772 656 005	.264	.908 990 681	.314	.326 493 720	.364	.909 041 744
.215	.751 355 536	.265	.895 116 792	.315	.316 790 077	.365	.901 908 633
.216	.730 256 027	.266	.881 350 103	.316	.307 150 159	.366	.894 816 397
.217	.709 354 697	.267	.867 689 406	.317	.297 573 357	.367	.887 764 700
.218	.688 648 815	.268	.854 133 512	.318	.288 059 083	.368	.880 753 211
.219	.668 135 699	.269	.840 681 248	.319	.278 606 738	.369	.873 781 600
.220	.647 812 718	.270	.827 331 461	.320	.269 215 741	.370	.866 849 542
.221	.627 677 286	.271	.814 083 013	.321	.259 885 517	.371	.859 956 716
.222	.607 726 866	.272	.800 934 783	.322	.250 615 498	.372	.853 102 802
.223	.587 958 965	.273	.787 885 669	.323	.241 405 122	.373	.846 287 488
.224	.568 371 136	.274	.774 934 581	.324	.232 253 835	.374	.839 510 459
.225	.548 960 972	.275	.762 080 448	.325	.223 161 088	.375	.832 771 410
.226	.529 726 114	.276	.749 322 213	.326	.214 126 342	.376	.826 070 035
.227	.510 664 239	.277	.736 658 834	.327	.205 149 061	.377	.819 406 032
.228	.491 773 069	.278	.724 089 286	.328	.196 228 719	.378	.812 779 102
.229	.473 050 365	.279	.711 612 556	.329	.187 364 793	.379	.806 188 952
.230	.454 493 924	.280	.699 227 648	.330	.178 556 768	.380	.799 635 287
.231	.436 101 585	.281	.686 933 578	.331	.169 804 136	.381	.793 117 821
.232	.417 871 221	.282	.674 729 378	.332	.161 106 394	.382	.786 636 265
.233	.399 800 745	.283	.662 614 091	.333	.152 463 046	.383	.780 190 338
.234	.381 888 102	.284	.650 586 777	.334	.143 873 596	.384	.773 779 758
.235	.364 131 275	.285	.638 646 506	.335	.135 337 571	.385	.767 404 250
.236	.346 528 275	.286	.626 792 363	.336	.126 854 482	.386	.761 063 538
.237	.329 077 165	.287	.615 023 449	.337	.118 423 857	.387	.754 757 351
.238	.311 776 013	.288	.603 338 862	.338	.110 045 230	.388	.748 485 421
.239	.294 622 938	.289	.591 737 735	.339	.101 718 139	.389	.742 247 481
.240	.277 616 088	.290	.580 219 199	.340	.093 442 126	.390	.736 043 268
.241	.260 753 636	.291	.568 782 399	.341	.085 216 740	.391	.729 872 522
.242	.244 033 792	.292	.557 426 493	.342	.077 041 534	.392	.723 734 985
.243	.227 454 785	.293	.546 150 651	.343	.068 916 069	.393	.717 630 401
.244	.211 014 895	.294	.534 954 053	.344	.060 839 907	.394	.711 558 518
.245	.194 712 401	.295	.523 835 890	.345	.052 812 618	.395	.705 519 087
.246	.178 545 630	.296	.512 795 365	.346	.044 833 777	.396	.699 511 858
.247	.162 512 929	.297	.501 831 691	.347	.036 902 963	.397	.693 536 588
.248	.146 612 675	.298	.490 944 093	.348	.029 019 759	.398	.687 593 034
.249	.130 843 267	.299	.480 131 804	.349	.021 183 754	.399	.681 680 956
.250	.115 203 132	.300	.469 394 069	.350	.013 394 542	.400	.675 800 115

TABLE III.

x	$\frac{e^{-x}}{x}$	x	$\frac{e^{-x}}{x}$	x	$\frac{e^{-x}}{x}$	x	$\frac{e^{-x}}{x}$
.400	1.675 800 115	.450	1.416 951 448	.500	1.213 061 319	.550	1.048 999 655
.401	.669 950 277	.451	.412 396 546	.501	.209 430 004	.551	.046 049 272
.402	.664 131 208	.452	.407 863 207	.502	.205 814 364	.552	.043 110 623
.403	.658 342 678	.453	.403 351 288	.503	.202 214 303	.553	.040 183 643
.404	.652 584 459	.454	.398 860 646	.504	.198 629 728	.554	.037 268 268
.405	.646 856 323	.455	.394 391 138	.505	.195 060 545	.555	.034 364 435
.406	.641 158 048	.456	.389 942 625	.506	.191 506 663	.556	.031 472 079
.407	.635 489 411	.457	.385 514 967	.507	.187 967 989	.557	.028 591 138
.408	.629 850 193	.458	.381 108 027	.508	.184 444 433	.558	.025 721 550
.409	.624 240 177	.459	.376 721 666	.509	.180 935 903	.559	.022 863 253
.410	.618 659 147	.460	.372 355 751	.510	.177 442 311	.560	.020 016 185
.411	.613 106 890	.461	.368 010 146	.511	.173 963 568	.561	.017 180 286
.412	.607 583 194	.462	.363 684 718	.512	.170 499 586	.562	.014 355 494
.413	.602 087 852	.463	.359 379 336	.513	.167 050 276	.563	.011 541 749
.414	.596 620 655	.464	.355 093 867	.514	.163 615 553	.564	.008 738 991
.415	.591 181 399	.465	.350 828 183	.515	.160 195 329	.565	.005 947 162
.416	.585 769 881	.466	.346 582 155	.516	.156 789 521	.566	.003 166 203
.417	.580 385 899	.467	.342 355 654	.517	.153 398 042	.567	.000 396 054
.418	.575 029 255	.468	.338 148 555	.518	.150 020 809	.568	0.997 636 657
.419	.569 699 750	.469	.333 960 732	.519	.146 657 738	.569	.994 887 956
.420	.564 397 190	.470	.329 792 060	.520	.143 308 746	.570	.992 149 892
.421	.559 121 381	.471	325 642 417	.521	.139 973 752	.571	.989 422 410
.422	.553 872 131	.472	.321 511 680	.522	.136 652 673	.572	.986 705 451
.423	.548 649 251	.473	.317 399 728	.523	.133 345 428	.573	.983 998 961
.424	.543 452 552	.474	.313 306 440	.524	.130 051 938	.574	.981 302 883
.425	.538 281 847	.475	.309 231 698	.525	.126 772 123	.575	.978 617 163
.426	.533 136 953	.476	.305 175 383	.526	.123 505 902	.576	.975 941 745
.427	.528 017 687	.477	.301 137 378	.527	.120 253 199	.577	.973 276 575
.428	.522 923 866	.478	.297 117 567	.528	.117 013 935	.578	.970 621 598
.429	.517 855 313	.479	.293 115 834	.529	.113 788 032	.579	.967 976 762
.430	.512 811 848	.480	.289 132 066	.530	.110 575 414	.580	.965 342 011
.431	.507 793 296	.481	.285 166 149	.531	.107 376 005	.581	.962 717 294
.432	.502 799 483	.482	.281 217 970	.532	.104 189 730	.582	.960 102 558
.433	.497 830 235	.483	.277 287 419	.533	.101 016 512	.583	.957 497 750
.434	.492 885 381	.484	.273 374 384	.534	.097 856 278	.584	.954 902 819
.435	.487 964 752	.485	.269 478 756	.535	.094 708 954	.585	.952 317 712
.436	.483 068 179	.486	.265 600 427	.536	.091 574 466	.586	.949 742 380
.437	.478 195 495	.487	.261 739 287	.537	.088 452 741	.587	.947 176 769
.438	.473 346 536	.488	.257 895 232	.538	.085 343 708	.588	.944 620 831
.439	.468 521 138	.489	.254 068 153	.539	.082 247 295	.589	.942 074 515
.440	.463 719 139	.490	.250 257 947	.540	.079 163 430	.590	.939 537 771
.441	.458 940 378	.491	.246 464 509	.541	.076 092 043	.591	.937 010 549
.442	.454 184 696	.492	.242 687 735	.542	.073 033 064	.592	.934 492 801
.443	.449 451 935	.493	.238 927 523	.543	.069 986 422	.593	.931 984 477
.444	.444 741 939	.494	.235 183 771	.544	.066 952 050	.594	.929 485 529
.445	.440 054 553	.495	.231 456 378	.545	.063 929 878	.595	.926 995 909
.446	.435 389 623	.496	.227 745 244	.546	.060 919 838	.596	.924 515 569
.447	.430 746 998	.497	.224 050 269	.547	.057 921 862	.597	.922 044 461
.448	.426 126 527	.498	.220 371 355	.548	.054 935 884	.598	.919 582 538
.449	.421 528 059	.499	.216 708 404	.549	.051 961 837	.599	.917 129 753
.450	.416 951 448	.500	.213 061 319	.550	.048 999 655	.600	.914 686 060

TABLE III.

x	$\frac{e^{-x}}{x}$	x	$\frac{e^{-x}}{x}$	x	$\frac{e^{-x}}{x}$	x	$\frac{e^{-x}}{x}$
.600	0.914 686 060	.650	0.803 147 349	.700	0.709 407 577	.750	0.629 822 070
.601	.912 251 412	.651	.801 112 123	.701	.707 687 542	.751	.628 354 757
.602	.909 825 764	.652	.799 083 940	.702	.705 973 114	.752	.626 891 973
.603	.907 409 069	.653	.797 062 766	.703	.704 264 268	.753	.625 433 701
.604	.905 001 282	.654	.795 048 570	.704	.702 560 980	.754	.623 979 921
.605	.902 602 358	.655	.793 041 317	.705	.700 863 226	.755	.622 530 616
.606	.900 212 253	.656	.791 040 976	.706	.699 170 981	.756	.621 085 766
.607	.897 830 921	.657	.789 047 514	.707	.697 484 222	.757	.619 645 354
.608	.895 458 319	.658	.787 060 899	.708	.695 802 923	.758	.618 209 361
.609	.893 094 403	.659	.785 081 099	.709	.694 127 063	.759	.616 777 770
.610	.890 739 130	.660	.783 108 083	.710	.692 456 616	.760	.615 350 562
.611	.888 392 455	.661	.781 141 818	711	.690 791 560	.761	.613 927 719
.612	.886 054 335	.662	.779 182 273	.712	.689 131 870	.762	.612 509 224
.613	.883 724 729	.663	.777 229 418	.713	.687 477 525	.763	.611 095 059
.614	.881 403 594	.664	.775 283 221	.714	.685 828 499	.764	.609 685 206
.615	.879 090 887	.665	.773 343 651	.715	.684 184 772	.765	.608 279 648
.616	.876 786 566	.666	.771 410 678	.716	.682 546 319	.766	.606 878 368
.617	.874 490 590	.667	.769 484 271	.717	.680 913 118	.767	.605 481 347
.618	.872 202 918	.668	.767 564 400	.718	.679 285 146	.768	.604 088 569
.619	.869 923 507	.669	.765 651 035	.719	.677 662 381	.769	.602 700 017
.620	.867 652 319	.670	.763 744 146	.720	.676 044 800	.770	.601 315 673
.621	.865 389 311	.671	.761 843 703	.721	.674 432 381	.771	.599 935 521
.622	.863 134 444	.672	.759 949 678	.722	.672 825 103	.772	.598 559 544
.623	.860 887 677	.673	.758 062 039	.723	.671 222 942	.773	.597 187 724
.624	.858 648 971	.674	.756 180 759	.724	.669 625 878	.774	.595 820 045
.625	.856 418 286	.675	.754 305 808	.725	.668 033 888	.775	.594 456 492
.626	.854 195 582	.676	.752 437 158	.726	.666 446 951	.776	.593 097 046
.627	.851 980 822	.677	.750 574 779	.727	.664 865 045	.777	.591 741 691
.628	.849 773 966	.678	.748 718 643	.728	.663 288 149	.778	.590 390 412
.629	.847 574 975	.679	.746 868 723	.729	.661 716 242	.779	.589 043 192
.630	.845 383 811	.680	.745 024 989	.730	.660 149 301	.780	.587 700 014
.631	.843 200 436	.681	.743 187 414	.731	.658 587 308	.781	.586 360 864
.632	.841 024 813	.682	.741 355 969	.732	.657 030 239	.782	.585 025 723
.633	.838 856 903	.683	.739 530 628	.733	.655 478 076	.783	.583 694 577
.634	.836 696 670	.684	.737 711 362	.734	.653 930 796	.784	.582 367 410
.635	.834 544 076	.685	.735 898 145	.735	.652 388 380	.785	.581 044 206
.636	.832 399 084	.686	.734 090 949	.736	.650 850 806	.786	.579 724 949
.637	.830 261 659	.687	.732 289 748	.737	.649 318 055	.787	.578 409 624
.638	.828 131 762	.688	.730 494 513	.738	.647 790 106	.788	.577 098 215
.639	.826 009 359	.689	.728 705 219	.739	.646 266 939	.789	.575 790 706
.640	.823 894 413	.690	.726 921 839	.740	.644 748 534	.790	.574 487 083
.641	.821 786 888	.691	.725 144 347	.741	.643 234 872	.791	.573 187 329
.642	.819 686 749	.692	.723 372 716	.742	.641 725 932	.792	.571 891 430
.643	.817 593 961	.693	.721 606 920	.743	.640 221 694	.793	.570 599 371
.644	.815 508 489	.694	.719 846 934	·744	.638 722 139	.794	.569 311 136
.645	.813 430 298	.695	.718 092 731	.745	.637 227 248	.795	.568 026 711
.646	.811 359 353	.696	.716 344 286	.746	.635 737 001	.796	.566 746 080
.647	.809 295 619	.697	.714 601 573	.747	.634 251 379	.797	.565 469 228
.648	.807 239 063	.698	.712 864 568	.748	.632 770 363	.798	.564 196 142
.649	.805 189 651	.699	.711 133 244	.749	.631 293 933	.799	.562 926 806
.650	.803 147 349	.700	.709 407 577	.750	.629 822 070	.800	.561 661 205

TABLE III.

x	$\frac{e^{-x}}{x}$	x	$\frac{e^{-x}}{x}$	x	$\frac{e^{-x}}{x}$	x	$\frac{e^{-x}}{x}$
.800	0.561 661 205	.850	0.502 841 096	.900	0.451 744 066	.950	0.407 095 814
.801	.560 399 326	.851	.501 748 215	.901	.450 791 668	.951	.406 261 278
.802	.559 141 152	.852	.500 658 399	.902	.449 841 833	.952	.405 428 902
.803	.557 886 671	.853	.499 571 640	.903	.448 894 550	.953	.404 598 677
.804	.556 635 868	.854	.498 487 924	.904	.447 949 811	.954	.403 770 597
.805	.555 388 729	.855	.497 407 241	.905	.447 007 608	.955	.402 944 654
.806	.554 145 238	.856	.496 329 580	.906	.446 067 931	.956	.402 120 842
.807	.552 905 383	.857	.495 254 930	.907	.445 130 772	.957	.401 299 153
.808	.551 669 149	.858	.494 183 279	.908	.444 196 121	.958	.400 479 580
.809	.550 436 523	.859	.493 114 617	.909	.443 263 971	.959	.399 662 117
.810	.549 207 489	.860	.492 048 933	.910	.442 334 314	.960	.398 846 756
.811	.547 982 035	.861	.490 986 216	.911	.441 407 136	.961	.398 033 491
.812	.546 760 147	.862	.489 926 455	.912	.440 482 434	.962	.397 222 313
.813	.545 541 810	.863	.488 869 639	.913	.439 560 198	.963	.396 413 218
.814	.544 327 012	.864	.487 815 758	.914	.438 640 419	.964	.395 606 197
.815	.543 115 739	.865	.486 764 801	.915	.437 723 089	.965	.394 801 243
.816	.541 907 977	.866	.485 716 757	.916	.436 808 198	.966	.393 998 351
.817	.540 703 713	.867	.484 671 616	.917	.435 895 740	.967	.393 197 513
.818	.539 502 933	.868	.483 629 367	.918	.434 985 705	.968	.392 398 722
.819	.538 305 624	.869	.482 590 000	.919	.434 078 084	.969	.391 601 972
.820	.537 111 774	.870	.481 553 505	.920	.433 172 871	.970	.390 807 256
.821	.535 921 368	.871	.480 519 870	.921	.432 270 056	.971	.390 014 567
.822	.534 734 394	.872	.479 489 087	.922	.431 369 631	.972	.389 223 899
.823	.533 550 838	.873	.478 461 143	.923	.430 471 588	.973	.388 435 245
.824	.532 370 688	.874	.477 436 030	.924	.429 575 919	.974	.387 648 598
.825	.531 193 930	.875	.476 413 737	.925	.428 682 615	.975	.386 863 952
.826	.530 020 553	.876	.475 394 253	.926	.427 791 669	.976	.386 081 301
.827	.528 850 542	.877	.474 377 570	.927	.426 903 073	.977	.385 300 637
.828	.527 683 886	.878	.473 363 676	.928	.426 016 818	.978	.384 521 955
.829	.526 520 571	.879	.472 352 562	.929	.425 132 897	.979	.383 745 248
.830	.525 360 586	.880	.471 344 218	.930	.424 251 301	.980	.382 970 509
.831	.524 203 917	.881	.470 338 633	.931	.423 372 023	.981	.382 197 732
.832	.523 050 552	.882	.469 335 799	.932	.422 495 055	.982	.381 426 911
.833	.521 900 479	.883	.468 335 705	.933	.421 620 389	.983	.380 658 039
.834	.520 753 685	.884	.467 338 341	.934	.420 748 017	.984	.379 891 111
.835	.519 610 157	.885	.466 343 699	.935	.419 877 931	.985	.379 126 119
.836	.518 469 885	.886	.465 351 767	.936	.419 010 124	.986	.378 363 057
.837	.517 332 855	.887	.464 362 536	.937	.418 144 587	.987	.377 601 920
.838	.516 199 055	.888	.463 375 998	.938	.417 281 314	.988	.376 842 700
.839	.515 068 474	.889	.462 392 142	.939	.416 420 297	.989	.376 085 393
.840	.513 941 099	.890	.461 410 958	.940	.415 561 527	.990	.375 329 991
.841	.512 816 919	.891	.460 432 438	.941	.414 704 998	.991	.374 576 488
.842	.511 695 921	.892	.459 456 572	.942	.413 850 701	.992	.373 824 879
.843	.510 578 093	.893	.458 483 350	.943	.412 998 630	.993	.373 075 157
.844	.509 463 425	.894	.457 512 764	.944	.412 148 776	.994	.372 327 317
.845	.508 351 903	.895	.456 544 803	.945	.411 301 133	.995	.371 581 351
.846	.507 243 517	.896	.455 579 459	.946	.410 455 693	.996	.370 837 255
.847	.506 138 255	.897	.454 616 723	.947	.409 612 448	.997	.370 095 022
.848	.505 036 105	.898	.453 656 584	.948	.408 771 392	.998	.369 354 646
.849	.503 937 056	.899	.452 699 035	.949	.407 932 516	.999	.368 616 121
850	.502 841 096	.900	451 744 066	.950	.407 095 814	1.000	.367 879 441

TABLE IV.

x	$\frac{e^{-x}}{x}$	x	$\frac{e^{-x}}{x}$
1.00	0.367 879 441	1.50	0.148 753 440
1.01	.360 612 851	1.51	.146 297 999
1.02	.353 524 451	1.52	.143 889 399
1.03	.346 608 700	1.53	.141 526 580
1.04	.339 860 271	1.54	.139 208 507
1.05	.333 274 047	1.55	.136 934 177
1.06	.326 845 104	1.56	.134 702 610
1.07	.320 568 708	1.57	.132 512 855
1.08	.314 440 302	1.58	.130 363 986
1.09	.308 455 499	1.59	.128 255 102
1.10	.302 610 076	1.60	.126 185 324
1.11	.296 899 965	1.61	.124 153 798
1.12	.291 321 245	1.62	.122 159 691
1.13	.285 870 138	1.63	.120 202 193
1.14	.280 543 002	1.64	.118 280 514
1.15	.275 336 321	1.65	.116 393 884
1.16	.270 246 708	1.66	.114 541 554
1.17	.265 270 890	1.67	.112 722 794
1.18	.260 405 711	1.68	.110 936 890
1.19	.255 648 121	1.69	.109 183 150
1.20	.250 995 177	1.70	.107 460 897
1.21	.246 444 033	1.71	.105 769 469
1.22	.241 991 940	1.72	.104 108 225
1.23	.237 636 242	1.73	.102 476 538
1.24	.233 374 369	1.74	.100 873 793
1.25	.229 203 837	1.75	.099 299 396
1.26	.225 122 243	1.76	.097 752 764
1.27	.221 127 261	1.77	.096 233 327
1.28	.217 216 641	1.78	.094 740 532
1.29	.213 388 204	1.79	.093 273 838
1.30	.209 639 841	1.80	.091 832 716
1.31	.205 969 509	1.81	.090 416 650
1.32	.202 375 229	1.82	.089 025 138
1.33	.198 855 084	1.83	.087 657 687
1.34	.195 407 215	1.84	.086 313 819
1.35	.192 029 823	1.85	.084 993 063
1.36	.188 721 160	1.86	.083 694 963
1.37	.185 479 533	1.87	.082 419 070
1.38	.182 303 299	1.88	.081 164 950
1.39	.179 190 867	1.89	.079 932 174
1.40	.176 140 689	1.90	.078 720 326
1.41	.173 151 265	1.91	.077 528 998
1.42	.170 221 139	1.92	.076 357 793
1.43	.167 348 897	1.93	.075 206 320
1.44	.164 533 166	1.94	.074 074 201
1.45	.161 772 612	1.95	.072 961 062
1.46	.159 065 942	1.96	.071 866 541
1.47	.156 411 895	1.97	.070 790 282
1.48	.153 809 249	1.98	.069 731 938
1.49	.151 256 816	1.99	.068 691 169
1.50	.148 753 440	2.00	.067 667 642

ROYAL SOCIETY OF CANADA

TRANSACTIONS

SECTION IV.

GEOLOGICAL AND BIOLOGICAL SCIENCES

PAPERS FOR 1903

I.—*An Experimental Study on the Effect of the Blood-sera of Normal and Immunized Goats in Modifying the Progress of Tuberculous Infection.*

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(Communicated by Professor J. G. Adami, M.D., and read May 19, 1903.)

One of the most important subjects, if not indeed the most important, occupying the attention of the experimental investigator in the domain of medicine at the present time, is the discovery of some curative agent to be employed in that most dread and widespread disease to which human beings are subject, tuberculosis. For the past fifteen years some of the brightest intellects have been at work on this problem with as much zeal and hope, albeit let us confess with more knowledge, as was ever expended by the philosophers of old in the search for the "Philosopher's Stone" or the "Elixir of Life." We have, however, reluctantly to admit, that the collective result of these most searching and extensive investigations, while beyond doubt it has increased our knowledge of the nature of the tubercle bacillus and the morbid processes induced by it, has lead as yet to but little practical advance. The final solution of the problem has hitherto eluded our grasp, and investigator after investigator has, like his prototype the more dramatic alchymist of the dark ages, seen the golden vision fade from his eyes when the prize was thought to be won.

The brilliant success that has crowned the efforts of experimenters to produce an antitoxic serum for diphtheria and hydrophobia, and the somewhat less valuable results that have been attained in tetanus, septicæmia, and typhoid fever, have excited the justifiable hope that a similar remedy might be devised in tuberculosis. Here, however, the problem has turned out to be by no means as simple as in the case of the diseases just mentioned. Practical experience has shown that the efficacy of the antitoxic sera hitherto prepared is in direct ratio to the virulence of the diseases in which they are employed. Unlike diphtheria tuberculosis is not a self-limited disease, nor does it kill by septicæmia. It belongs to that group of diseases to which leprosy, syphilis,

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The experiments detailed in the following paper were begun on the initiative of the Hon. E. H. Bronson, of Ottawa, who has generously borne the expense of the investigation, and has evinced throughout the most kindly interest in the work.

and actinomycosis also belong, that have a notably slow progression, presenting, it is true, effects referable to a mild intoxication, but also characterized by the production of gross organic lesions (granulomata) in various parts. Here it is obvious that a purely antitoxic serum, that is to say, one that merely neutralizes the poisons elaborated by the tubercle bacillus in the course of its growth, is hardly likely to prove effective. Should it be possible to prepare such a serum, and, as we shall see, it undoubtedly is, the disease would still progress. To be of real value a serum would apparently need to possess germicidal as well as antitoxic properties. Even in the days of the discovery of the diphtheria antitoxin and before (1884), attempts were made to solve the problem and the names of Héricourt and Richet stand out as pioneers in this line of research. Since then the number of workers has increased marvellously, and the work of Koch, Maragliano, Babès, Maffuci and Di Vestea, Behring, Niemann, and on this continent, Trudeau, and DeSchweinitz, is a monument of painstaking research, scientific accuracy, and devotion to truth. No one who has not investigated the subject would credit the enormous amount of labour expended on this one problem. A glance at the bibliography appended to this paper, which represents merely one phase of the subject, namely that relating to animal sera, will emphasize the truth of this remark.

The subject has been attacked in various ways. One class of investigator has attempted the cure of tuberculosis by means of drugs, a mode which seems again of late to be coming into prominence. A second school, of which Koch has for some years been the leading spirit, has sought to produce immunity and cure the disease by the injection of various toxins derived from the tubercle bacillus or chemical modifications thereof. To this category of remedies belong the various tuberculins,oxytuberculin, tuberculocidin, and antiphthisin. By the injection of these substances it is sought to stimulate the cells of the body to the elaboration of an antitoxic substance in such amount as to neutralize the poisons eliminated by the bacilli. The third series of experimenters has endeavored by the injection of various extracts of tubercle bacilli or in some cases the living attenuated germs, to produce immunity in certain of the lower animals, and then to use the blood serum of animals thus fortified to combat the disease in other individuals. It is with work of this last class that this paper alone will deal.

The first observation, and one that has led to all the rest, was that of Héricourt and Richet. In 1888 they noted that if a rabbit, which is very susceptible to this germ, be inoculated with the staphylococcus pyosepticus, it may be rendered refractory to its action by intraperitoneal injection of dog's blood, an animal that possesses a natural immunity to the infection. This suggested to their minds that the same

thing might hold good in tuberculosis. Without entering into details, the chief conclusions to which they arrived were (1) that in animals the subject of experimental tuberculosis the injection of dog's blood will arrest the disease provided the germ be not too virulent, or will retard it if it be very virulent. (2). The serum of a dog injected into a healthy rabbit will prevent the development of experimental tuberculosis subsequently. (3) The serum of a dog previously inoculated with tuberculosis when injected into rabbits already tuberculized will aggravate the disease. They did not believe that dog's serum possessed a specific curative action in tuberculosis, although it seemed to have a powerful action against some of the effects of the germ and exerted a tonic action on nutrition (3.) Extract of dog's liver possessed similar properties. In some of their later work they employed the ass (36). The blood of the normal ass, like that of the dog, was found to retard the tuberculous process, but the serum of an ass previously injected with tubercle bacilli proved to be still more potent.

The special merit of Héricourt and Richet lies in the fact that they were the first to see the possibility of producing by the injection of tubercular virus a specific means of combatting the disease. It was Maragliano (17), however, who first demonstrated by scientific proofs that a tubercular antitoxin did exist and applied it to the treatment of human tuberculosis. His results were given to the French Congress of Medicine at Bordeaux in 1895, and his subsequent investigations have proved to be so brilliant and painstaking that a brief reference here will not be out of place.

Koch's original tuberculin, at one time used largely for therapeutic purposes, was prepared by heat, so that it did not represent the full toxic properties of the bacillus, for, as Auclair has proved, certain volatile poisons are given off in the course of preparation. These substances have been shown by Maragliano to cause convulsions when injected into rabbits. The glycerine also used in the preparation is toxic. Maragliano therefore employs a watery extract of bacilli. He makes use of two toxins: A., prepared by concentrating a culture of the bacilli over a water-bath at 100°C. for three or four days; and B., a culture filtered through a Chamberland filter at the room temperature and concentrated in a vacuum at a temperature less than 30°C. For inoculation purposes he uses three parts of A. and one of B. This mixture is injected into horses beginning with a dose of two milligrammes per kilo. of the body weight, increased gradually one milligramme a day up to forty or fifty. The injections are stopped if the animals show signs of fever or emaciation until recovery has taken place. The whole process is spread over about six months. Before using the horse serum thus prepared Maragliano waits three or four weeks until the urine is

free from toxic bodies. One c. cm. will counteract the smallest dose of tuberculin that will produce a reaction in a tuberculous man. The serum is said also to possess appreciable germicidal properties. Maragliano has knowledge of 1,362 tuberculous patients treated by his serum. Eighty per cent were benefited by it. The most favorable results were obtained in afebrile cases with localized lesions. In cases of mixed infection the serum was less useful. Maragliano has also shown that the serum of tuberculous patients treated with his serum was two to three times as antitoxic as it was before the injections.

Maffucci and Di Vestea (56), have attempted to attain the same end by using sheep, which are supposed to be refractory to tuberculosis, employing the methods of Héricourt and Richet and the "mithridatization" method with Behring's antitoxin. They injected both dead and living bacilli into the sheep, but found that the serum resulting was neither curative nor prophylactic, but at most caused some retardation of the disease. They found moreover that while the serum was innocuous for guinea-pigs in doses of two c. cm. per hundred grammes, one-fifth of a c. cm. in rabbits produced a fatal hæmoglobinuria. When added to a culture of tubercle bacilli in the proportion of four to one some attenuation of the germs was produced.

Niemann (69) has used goats. He injected for some weeks a tuberculin derived from a very virulent stock of bacilli until he was giving fifteen c. cm. Then he injected an alcoholic precipitate from tuberculin that had been proved to be extremely toxic, beginning at first with twelve to eighteen milligrammes and increasing after a month to half to one gramme. He found that by the use of the antitoxic serum thus prepared he could prolong the disease and claimed to have observed good results in human beings.

The results of DeSchweinitz and Dorset (80), are somewhat similar. They inoculated cows and horses with tuberculin and bacilli and found that this conferred on their sera some powers of retarding the disease in guinea-pigs. The serum of cows inoculated with attenuated bacilli proved to be more potent.

Trudeau and Baldwin (105), were able to produce a marked degree of immunity in rabbits by the injection of attenuated cultures but the serum of such animals did not appear to have gained antitoxic properties. In a large number of experiments with sheep, asses, rabbits, and chickens inoculated with living germs, they thought that the sera thus fortified possessed slight antitoxic properties. Their results were, however, not very convincing.

From the above mentioned observations it will be gathered that the results of experiment are by no means uniform and not entirely satisfactory. The best results have been obtained where in addition to the

toxins the substance of the germs has been employed as well, but even in this case there is some discrepancy between the different observers. In fact Maragliano is the only one who seems to be at all sanguine as to the value of his serum.

The few observations I have made have been carried out on slightly different lines from those hitherto published in the hope that they would throw some light on a somewhat doubtful question and possibly elicit some new facts. I have employed goats for the purpose, finding them on the whole the most suitable. It used to be thought that goats were absolutely refractory to tuberculosis but this is certainly not the case. (See Colin. Compt. rend. Acad. de Sc., Paris, 1891, CXIII, 219). It is true, however, that in a natural state they rarely suffer from the disease. It is, however, possible to give them the disease by injecting living virulent bacilli in considerable quantities into the circulation, although subcutaneous injection will not suffice. They are therefore relatively immune. Being also hardy animals they stand the various manipulations well. A considerable quantity of serum can be obtained from them which is of good quality and keeps well. Goat serum has the further advantage, as Lépine has shown (Sém. méd. 1891, XI., 21), that it produces much less hæmolysis when added to human blood than does dog's serum. In spite of many advantages goats have not been used to any great extent in this kind of work. Bertin and Picq, Boinet and Niemann are the most noteworthy of those who have done so and report good results. Bertin and Picq (6) found that rabbits previously injected with goat's blood were able to resist a subsequent infection with tuberculosis, although they state that the injections had no effect in animals already tuberculized.

The Effects of Normal Goat Serum.

It is now a well recognized fact that the sera of several normal animals possess what may be termed natural antitoxic bodies, or perhaps more correctly alexins. Thus, horse serum possesses about two or three hundred antitoxic units against the diphtheria germ, and according to Maragliano human serum possesses three to four hundred units against the bacillus of tuberculosis. It was thought advisable, therefore, to determine first whether normal goat serum could in any sense be considered protective against tuberculosis. Should this prove to be the case, one might then try to increase this up to a practical point.

For the purposes of the experiment it was obviously necessary to obtain the serum without contamination from bacteria and as nearly normal as possible. To attain this the following method was adopted. A large healthy male goat was taken, the hair was removed over the course of the external jugular vein in the neck, and the skin washed and sterilized by means of a solution of sublimate (1—1000). A large

sterilized trocar attached by a rubber tube to a sterilized bottle was then inserted into the vein and the blood allowed to flow into the vessel. The serum was allowed to separate in a cold chamber, the clear portion carefully decanted off, and one-quarter per cent of chloroform added as a preservative. It was found that the serum thus prepared kept perfectly well for some weeks.

Experiment I.

The first experiment was conducted under the following conditions: Eight guinea-pigs and ten rabbits, presumably in good health were taken, and their weight and temperature before inoculating were ascertained. They were then numbered and kept in separate hutches. On March 13th, 1902, they were inoculated, one-half intraperitoneally and the other under the skin of the left leg, with a culture of the bacillus tuberculosis of extremely mild virulence, standardized as follows:—

A culture of the Bacillus Typhi Abdominalis, taken from old laboratory stock, was inseminated in 1.5% acid broth and grown in the incubator at the usual temperature for twenty-four hours. The culture obtained was then killed with formalin vapour and used as a standard. A glycerine-agar culture of the tubercle bacillus referred to was ground up in a sterile mortar with sterile normal saline solution. This was allowed to stand until the heavier portions had sunk to the bottom. The opalescent supernatant portion was carefully decanted off and diluted with sterile normal salt solution until it reached the same degree of opacity as the standard culture of the B. Typhi. Hanging-drops were then examined under the microscope to see that there were no gross masses of bacilli floating about. One cubic centimetre of this material was then used for inoculating. Care was, of course, taken as far as possible to avoid contamination in the course of the various manipulations, sterilized vessels and instruments being invariably employed.

The animals to be injected were shaved at the desired points and the skin sterilized with bichloride, 1—1,000. The inoculations were made with an all-metal syringe of five c. cm. capacity, previously boiled.

The reason for using a culture of weak virulence to begin with was that guinea-pigs are very susceptible to tuberculosis and it was inferred from observations already referred to, that should goat serum possess any antitoxic powers these would be extremely slight.

One-half of the animals were inoculated subcutaneously over the abdomen with two c. cm. of normal goat-serum every second day. Subsequently the temperatures were taken every day and the weights once a week. Instead of estimating, as others have done, the effect of the injections by keeping the animals until they died spontaneously, and taking into consideration merely the loss of weight, it was thought advis-

able, as we were dealing with germs of such mild virulence and there was a possibility of the animals recovering, to kill them at stated intervals and determine the amount of tuberculosis by the naked eye and the microscope. By this method an exact appreciation of the state of things could be obtained. By arranging them in pairs according to weight it was also possible to compare animals of approximately the same degree of resisting power.

The subjoined table will give at a glance the more important features of the experiment:—

Nos.	T. BEFORE INOC.	T. AFTER.	WT. BEFORE INOC.	WT. AFTER.	REMARKS.
G—Pig.					
I.	100·8	101·8	425 grms.	477·5	Minimal tbc.
IV.	99·2 ?	103·	420	443	? lymphatic tbc.
II.	98 ?	101·4	454	452·7	Tbc. of testis
VI.	102·4	103	443	480·5	Local tbc. in abdom. wall.
III.	101·6	102·9	489	525	Slight tbc.
VII.	101·8	102·4	349	377·2	Slight tbc.
V.	102	102·4	327	399	? tbc.
VIII.	100	102·6	217	232	No positive tbc.
Rab.					
I.	102·5	101·4	1880	1431	No tbc.
VI.	100·4	102·4	1432	1396	No tbc.
V.	101·4		1556		No tbc.
IX.	100·2	103·2	2142	1790	No tbc.
VIII.	100·8		1475		Tbc. of lung and pleura.
II.	102·4	101·6	1847	1667	No tbc.
VII.	100·6	103·3	1102	1322	No tbc.
IV.	101·6	101·9	1932	1569	No tbc.
X.	109·6		1510		Minimal local tbc.
III.	102·8	102·1	2101	1646	No tbc.

N. B.—In the above table the numbers in italics were given normal goat serum The weights and temperatures after inoculation are average. The animals are grouped in pairs according to weight.

In the above table I do not lay much stress upon the weights and temperatures before inoculation inasmuch as observations were not made for a sufficiently long time before the experiment was begun.

Two guinea-pigs and two rabbits died spontaneously before the conclusion of the experiment, apparently from some gastro-intestinal disturbance. The rest of the pigs were killed after thirty days, and one-half of the remaining rabbits about the same time. The first animals killed presented so little pathological change that it was thought advisable to keep the remaining six for two weeks longer in the hope that the lesions would be more marked. Autopsies were performed at various times with the special object of determining the extent of the dissemination of the tuberculous virus, the effect of the serum injections, if any, and the character of the bacilli of tuberculosis found in the various parts. Portions of the organs were examined microscopically, both by the hæmatoxylin method and the modified Ziehl-Nielsen method for tubercle bacilli. Smears were made from the organs and stained for bacteria. Cultures were also taken from the organs.

Abstracts of the autopsy protocols are herewith presented:—

GUINEA-PIG I.

Inoculated March 13th with 1 c.cm. of standard dilution of B. Tuberculosis intraperitoneally. Killed April 15th. Abdominal wall at site of inoculation red and inflamed, containing a small caseous mass. Three inguinal glands on the left side enlarged, a smear from which gave tubercle bacilli. *Spleen*: large, soft and pale. Other organs normal. Microscopical examination showed the organs to be congested, but without obvious tuberculosis. The *inguinal glands* showed inflammatory hyperplasia. Cultures from the heart-blood, bile and liver were sterile after thirty days.

GUINEA-PIG II.

Inoculated intraperitoneally. Died on twenty-fifth day. One or two small nodules, not caseous, in the abdominal wall at the site of inoculation. One minute elevated spot of yellowish colour on right testis and four or five similar ones on the left, surrounded by an inflammatory areola. Microscopically, these were composed of granulation tissue, small round-cells, and fibroblasts. Tubercle bacilli were demonstrated. Other organs normal. Cultures from heart-blood and spleen, sterile after thirty-four days.

GUINEA-PIG III.

Killed April 15th. Inoculated in left leg. Slight hæmorrhage in region of the inoculation wound. Two or three glands in the left inguinal region enlarged, soft, and caseous looking. Smears from these gave the B. Tuberculosis. Other organs normal. Cultures from liver, bile, and heart-blood sterile. Cultures from the affected glands and from the liver did not develop tubercle bacilli.

GUINEA-PIG IV.

Killed April 15th. Inoculated in peritoneal cavity. *Given goat serum*, 2 c.cm. every second day. Anterior abdominal wall intensely hæmorrhagic from the inoculations. Two or three inguinal glands on the left side, and a few mesenteric glands enlarge but films did not show tubercle bacilli. All organs normal. Cultures from the heart-blood, liver, and bile, sterile.

GUINEA-PIG V.

Killed April 15th. Inoculated in left leg. Slight hæmorrhage in region of original inoculation. The glands in the left inguinal region were enlarged and reddened, and a few mesenteric glands were swollen. Smears from mesenteric glands showed no tubercle bacilli. All organs normal. Cultures from inguinal glands, heart-blood, and bile, sterile.

GUINEA-PIG VI.

Killed April 15th. Inoculated intraperitoneally. Moderate hæmorrhage at site of inoculation of serum with a hæmatoma in the left inguinal region. At site of original inoculation the abdominal wall was thickened and contained a small caseous focus. All organs normal. Cultures heart-blood and bile, sterile. *Given serum.*

GUINEA-PIG VII.

Inoculated in left leg. *Given serum.* Great extravasation of blood into tissues of the thorax and abdominal wall. Glands of left inguinal region and one or two retroperitoneal glands on the left side enlarged, reddened, and the latter with some spots of opaque white. *Stomach* and *intestines* reddened and distended with gas. Other organs normal. Cultures from heart-blood and retroperitoneal gland, sterile; from liver, staphylcoccus albus.

GUINEA-PIG VIII.

Died on eighteenth day. Inoculated in left leg. *Given serum.* Site of serum injections in the abdominal wall infiltrated, reddened, and acutely inflamed. There was one small superficial focus with necrosis. The tissues over the thorax were much infiltrated. *Spleen*: swollen. *Kidneys*: congested with petechial spots. *Mesenteric glands*: enlarged and red, but not caseous. Cultures from mesenteric glands, sterile; from suprarenal, staphylococcus albus.

RABBIT I.

Inoculated in leg. *Given serum.* No local signs at point of inoculation, All organs absolutely normal.

RABBIT II.

Killed in about thirty days. Inoculated intraperitoneally. One mesenteric gland enlarged, not proved to be tuberculous.

RABBIT III.

Killed in about thirty days. No local signs at site of subcutaneous inoculation in abdomen. All organs normal except the liver which contained coccidia. A few mesenteric glands enlarged along the vessels as if from hæmatogenic infection, but films from these showed no tubercle bacilli.

RABBIT IV.

Inoculated intraperitoneally. Killed May 12th. No local signs at site of inoculation. All organs healthy looking. One or two enlarged glands noticed in the mesentery. Smears from these did not show tubercle bacilli.

RABBIT V.

Died in thirteen days. Inoculated in leg. *Given serum.* Abdominal and thoracic walls thickened, reddened, and very œdematous. One or two

mesenteric glands slightly enlarged. *Kidneys*: cloudy. No signs of tuberculosis. Cultures from heart-blood, sterile.

RABBIT VI.

Inoculated in leg. No signs of tuberculosis.

RABBIT VII.

Inoculated intraperitoneally. *Given serum.* Slight congestion of the abdominal wall where the serum was given. All organs healthy.

RABBIT VIII.

Died in thirteen days. Inoculated in leg. No local signs in glands of groin. Upper lobe of left lung much shrunken, full of large scattered caseous masses. Caseous pleurisy with thickening. One or two minute tubercles in apex of right lung. Other organs normal. Peribronchial glands caseous.

RABBIT IX.

Inoculated in leg. *Given serum.* All organs healthy. No local signs of the inoculation of the serum.

RABBIT X.

Died on twenty-first day. Inoculated intraperitoneally. *Given serum.* Subcutaneous tissues over site of inoculation slightly œdematous and reddened. A small caseous yellow spot on inner side of abdominal wall at site of original inoculation. Condition of gastroenteritis present which had apparently caused death. No other signs of tuberculosis elsewhere. Cultures from the heart-blood and liver, sterile.

It will be seen from the foregoing that of the guinea-pigs only one (No. 2), gave evidence of any dissemination of the tubercle bacilli to a distance from the site of the original inoculation. It had not received serum. In Nos. 1 and 4 the inguinal glands were affected; the bacilli were recovered in No. 1 which had not received serum, not found in No. 4 which had. In No. 6, which had received serum, the infection was strictly localized to the site of inoculation. In those inoculated in the leg, viz., Nos. 3, 5, 7 and 8, all except one showed enlargement of the inguinal glands. In only one that had not received serum were the bacilli recovered (No. 3). One that had received serum did not develop a local lesion (No. 8).

In the case of the rabbits, only one developed gross tuberculosis (No. 8), and this one had not received serum. This result was in general what one would have expected as rabbits are much more refractory to tuberculosis than are guinea-pigs. None of the culture tubes developed the specific bacillus, and when found in smears, they were in a state of extreme fragmentation and degeneration, showing that the infection was an extremely mild one. So far as I could see the inoculations of serum had no effect whatever upon the temperature of the animals receiving it, but the rabbits so treated lost weight rather rapid-

ly, although the pigs were unaffected. This was probably due to interference with the feeding, for the injections produced extensive areas of coagulation-necrosis in the abdominal wall and in one or two instances there was slight superficial suppuration. Apparently the injections of serum had some slight deterrent effect on the development of the tuberculous lesions, but it was felt that it was unwise to draw any positive conclusions from such a small series of animals, particularly with so mild a germ, so a second experiment was undertaken on similar lines but with several modifications suggested by the experience with the former series.

Experiment II.

Six guinea-pigs and twelve rabbits were placed under exactly the same conditions as to food, exercise, etc., and weighed at intervals of a week until an average normal weight was established. They were then grouped in pairs as nearly as possible according to the weight Rectal temperatures were taken daily for ten days to establish a mean normal temperature. Both the weights and the temperatures were found to vary in health between rather wide limits. The average temperature of the pigs was from 102° and 3-10ths to 102° and 8-10ths; that of the rabbits from 102° to 103° and 2-10ths.

All with the exception of two rabbits, which were retained as controls, were inoculated with one c. cm. of an emulsion of a more virulent, though still mild, culture of the tubercle bacillus in normal saline, standardized as before. One-half of the animals were given the inoculation in the left leg subcutaneously; the other half, intraperitoneally. Three days after inoculation one member of each pair was given a subcutaneous injection of one c. cm. of a fresh supply of normal serum from the same goat, collected with the same precautions as before. This was repeated every third day till the close of the experiment. The reason for reducing the dose was that the injection of the larger amounts of serum in the first series of animals produced much local disturbance. Two rabbits were given serum alone without bacilli, so as to act as controls. During the course of the investigation daily temperatures were taken and the animals were weighed weekly. A few of the animals died spontaneously before the six weeks allotted to the experiment had elapsed, but the remainder were killed in pairs on the same day A post-mortem was made immediately under strict aseptic conditions. In estimating the amount of disease resulting, I took into consideration the dissemination of the disease in the various organs, the amount of tissue destruction, the amount of repair, if any, the histological appearance of the lesions, and the morphology of the bacilli found. This necessitated the preparation of about two hundred microscopic pre-

parations. The table herewith subjoined will give a general idea of the conditions resulting:—

Nos.	T. BEFORE INOC.	T. AFTER.	WT. BEFORE INOC.	WT. AFTER.	REMARKS.
G—Pigs.					
I.		104·2		274·5	Adv. tbc.
IV.	102·5	103·8	343·5grms.	329 4	Ditto.
II.	102·4	103·6	413	397	Adv. tbc.
III.	102·3	103·9	459	351	Ditto.
V.	102·8	103·3	359·5	310·2	Mod. tbc.
VI.	102 4	103·6	356·5	348·	Less adv. tbc.
Rabbits.					
I.	102·9	104	1779·5	1999·6	Slight tbc.
II.	103	103·6	1992	1979·4	Ditto.
III.	102·2	103·6	1604	1665·2	Tbc. minimal.
XII.	102·5	102·5	1643	1853·6	Slight tbc.
IV.	103·2	103·5	1301·5	1650·8	Mod. tbc.
XI.	101·9	102·7	1308·5	1458·2	Slight tbc.
V.	101·8	103·7	1717	1880	Slight local.
VII.		103·5		1836·4	Less marked.
VIII.	102·5	103	2130	2280·6	Mod. tbc.
X.	102	103·2	2199·5	1949·2	No tbc.
VI.	101·7	102·9	1781	1999·4	Control.
IX.	103·1	103·3	1286·5	1676·4	Control.

N. B.—In this table animals are arranged in pairs. G—P V and VI and R. III, V, VII and XII inoculated in leg, others intraperitoneally. Nos. in italics were given serum. Weight and temperature average.

Abstracts of autopsy protocols:—

GUINEA-PIG I.

Inoculated with one-half c.cm. of a standardized emulsion in saline of B. Tuberculosis intraperitoneally. Given normal goat serum, one c.cm. every third day, beginning June 9th. Died on twentieth day.

Site of inoculation in abdominal wall a large caseous sore, not, however, from tuberculosis. Abdominal wall contained numerous miliary and confluent tubercles. Abdominal cavity contained much blood-stained fluid in which the B. Tuberculosis was demonstrated. Right pleural cavity ditto, but no bacilli. Extensive caseous tuberculosis in peritoneal membrane, retroperitoneal, perigastric, mesenteric, and anterior mediastinal glands.

Spleen much enlarged and almost full of confluent caseous tubercles. Liver full of miliary tubercles. Other organs free. Smears from the spleen, liver, and anterior mediastinal glands gave B. Tuberculosis. Cultures from heart-blood and spleen, sterile.

Microscopic examination. *Heart*: cloudy. *Lung*: Slight acute bronchitis, collapse and hæmorrhagic infarction, slight leucocytic infiltration in septa. *Spleen*: Large coalescing tubercles with central necrosis, and chromatolysis. Cells chiefly lymphocytes. No attempt at fibrosis. *Liver*: Numerous large miliary foci, of which the largest showed slight caseation. The tubercles were in the portal sheaths, and were composed chiefly of lymphocytes together with fairly numerous epithelioid cells staining well. No fibrosis. The remaining liver cells cloudy and fatty. *Kidney*: Cloudy. *Lymph-gland* (1): Large caseous foci with chromatolysis, very few epithelioid cells and no fibrosis. *Lymph-gland* (2): Similar, but with slight proliferation of fibrous tissue at the periphery of the caseous foci. *Abdominal wall*: Section showed the muscle to be cloudy and in parts infiltrated with lymphocytes and numerous epithilioid cells. No caseation nor fibrosis.

GUINEA-PIG IV.

Inoculated intraperitoneally. On twenty-first day some induration of the abdominal wall was observed and in two days more a small pustule formed. In three days this opened spontaneously, and smears gave moderate numbers of tubercle bacilli. Killed July 30th.

At site of inoculation were numerous pearly and caseous masses in the abdominal wall and over the peritoneal membrane generally. Great omentum converted into a thickened caseous mass. Spleen and liver much enlarged and riddled with miliary tubercles. The diaphragm presented numerous pearly tubercles. A few retroperitoneal and numerous mesenteric glands enlarged and caseous. Lungs showed miliary tubercles; the anterior mediastinal glands enlarged and caseous. Kidneys, cloudy. Smears from the mesenteric glands and peritoneal fluid, negative.

Microscopic examination. *Heart*: Cloudy. *Lung*: Fairly numerous tubercles in the perivascular lymph spaces, consisting of lymphocytes and a few leucocytes. No caseation nor fibrosis. Parts of the lung showed congestion and alveolar catarrh. *Spleen*: Great hyperplasia and large caseous masses. Slight overgrowth of stroma. One giant-cell seen. *Liver*: Numerous and rather large early tubercles in the portal sheaths consisting mainly of lymphocytes. A few giant-cells seen, but no fibrosis. *Lymph-gland*: markedly caseous, but without fibrosis.

An interesting feature in this animal was that it aborted about one month before death and the uterus was enormously enlarged and caseous, while caseous matter had been discharged per vaginam.

GUINEA-PIG II.

Inoculated intraperitoneally. In twenty-one days a very small lump formed at the site of the inoculation. Died on the twenty-fourth day.

A small caseous dot found in abdominal wall at the site of inoculation. Hæmorrhagic peritonitis. Clear fluid found in both pleural sacs. The diaphragm showed no tubercles. Spleen very large, hæmorrhagic, and filled with caseous masses. Liver much enlarged and filled with what appeared to be caseous infarcts. Right lung contained a small caseous point sur-

rounded by a congested zone. Anterior mediastinal glands enlarged and caseous. One or two retroperitoneal glands and a few inguinal ones enlarged and possibly tuberculous. Small pearly tubercles along vessels of mesentery of small intestine.

Great omentum, nodular and caseous. Other organs normal. Smears from the spleen, liver, and anterior mediastinal gland gave B. Tuberculosis; from peritoneal and left pleural fluid, negative. Cultures, sterile.

Microscopic examination. *Heart*: Cloudy. *Lung*: Some alveolar catarrh, numerous lymphocytes and leucocytes in the septa and alveolar walls, with slight cellular exudation into the alveolar spaces. *Spleen*: Enlarged, containing large confluent caseous masses with nuclear fragmentation. Exudation chiefly lymphocytes. No fibrosis. *Liver*: Numerous large tubercules in the portal sheaths, consisting mainly of lymphocytes, with in places caseation. Ischæmic necroses. Liver cells cloudy and fatty. *Lymph-glands* showed numerous small masses of caseation without peripheral fibrosis. *Abdominal wall*: Muscle fibres swollen and cloudy, with masses of lymphocytes and fairly numerous epithelioid cells between the muscle bundles. No fibrosis. Suprarenal and kidney, cloudy.

GUINEA-PIG III.

Inoculated intraperitoneally. *Given one c.cm. of goat serum every third day.* Died in twenty days. Broken tooth and infected jaw. Caseous focus in the abdominal wall at the site of inoculation, containing B. tuberculosis. Numerous small tubercles on lower portion of the peritoneum. Smears from these gave B. Tuberculosis. Great omentum contained large caseous nodules. Spleen and liver contained miliary tubercles. Films gave the specific bacillus. Diaphragm on under surface was covered with miliary tubercles. The anterior mediastinal glands enlarged and caseous, and a few retroperitoneal glands in the lumbar region enlarged, reddened, and showing beginning necrosis. Other organs free. Broth cultures from the heart-blood remained sterile.

Microscopic examination. *Heart* and *kidneys*: Cloudy. One minute patch of hæmorrhage with alveolar desquamation in the *lung* with but few leucocytes. *Spleen*: Follicles congested, pulp hyperplastic. Some large caseous areas without fibrosis. *Liver*: Cloudy and congested, with some fatty degeneration. Small miliary tubercles present, in only one of which was there beginning central caseation. A few epithelioid cells. No fibrosis. *Great omentum*: Full of caseous masses; one giant-cell seen. *Suprarenal*: Congested; a very small area of interstitial inflammation. *Abdominal wall*: Muscle fibres dissociated by inflammatory products, cloudy and disintegrated. Caseating tubercles with abundant lymphocytes fairly numerous epithelioid cells and polymorphonuclear leuccocytes. No fibrosis.

GUINEA-PIG V.

Inoculated in leg. *Given goat serum.* On twenty-first day nodule with infiltration of muscle at the site of inoculation. Killed on twenty-sixth day.

A caseous mass the size of a filbert found at site of inoculation. Two inguinal glands on left side enlarged and caseous and one on the right. Retroperitoneal glands similar. Two or three mesenteric glands caseous. Liver and spleen full of caseous masses. Minute tubercles in the great omentum, not caseous. Lungs showed miliary tubercles, and one or two of the anterior mediastinal glands enlarged, but not caseous. Kidneys,

normal. Smear from the retroperitoneal glands gave B. Tuberculosis. Cultures from the heart-blod and inguinal glands gave staphylococci, others sterile.

Microscopical examination. *Heart* and *kidneys*: Cloudy. *Lung*: fairly numerous miliary tubercles, some just beginning to caseate. No fibrosis. *Spleen*: Very extensive caseation. *Liver*: Numerous and large tubercles without caseation in the portal sheaths, consisting of abundant lympocytes and fairly numerous epithelioid cells. *Various glands* showed caseous centres.

GUINEA-PIG VI.

Inoculated in leg. On twelfth day induration about site of inoculation, and one inguinal gland felt on the left side. On twenty-first day caseous focus point in leg. Two inguinal glands felt. On twenty-second day got cheesy pus from abscess which contained fragmented bacilli of Tuberculosis. Killed on the twenty-sixth day.

At site of inoculation, a caseous abscess. A few inguinal glands on the left side and several retroperitoneal glands enlarged and caseous. A few small pearly tubercles on peritoneum in lower portion, but relatively few on the diaphragm. Spleen enlarged, presenting a multitude of small pearly tubercles. Liver contained numerous small caseous foci. Kidneys free. A few mesenteric glands caseous. Lungs contain miliary tubercles. One anterior mediastinal gland enlarged. Omentum contained a few tubercles. Smears from the inguinal glands and spleen showed B. Tuberculosis. The amount of tuberculosis present was not nearly so great as in pig V.

Microscopical examination. *Heart* and *kidneys*: Cloudy. *Lungs*: Acute congestion with infarction. Fairly numerous tubercles, one or two extensively caseated, composed chiefly of lymphocytes. *Spleen*: Fairly numerous small tubercles with only slight caseation. *Liver*: Numerous large tubercles in the portal sheaths without caseation, consisting of numerous lymphocytes and fairly abundant epithelioid cells.

RABBIT I.

Inoculated intraperitoneally. *Given serum.* Killed on fiftieth day. One caseous retroperitoneal gland was found just below right kidney, but smears from this did not give tubercle bacilli. A small caseous tubercle in base of right lung. Cultures, sterile.

Microscopic examination. *Lung*: Infiltration with lymphocytes and large mononuclear cells in septa about the great vessels. Other organs cloudy or normal.

RABBIT II.

Inoculated intraperitoneally. Killed on fifty-first day. One or two small caseous masses on surface of the large bowel, films from which gave the B. Tuberculosis. A few caseous looking streaks along the lymphatics of the mesentery. Two small retroperitoneal glands enlarged. Cultures, sterile.

Microscopic examination. *Nodules* from *bowel*: Caseous tubercles composed chiefly of lymphocytes without giant-cells. *Liver*: Congested, numerous polymorphonuclear, mononuclear cells and phagocytes containing pigment and fragments of cells in the spaces between the liver cells. Other organs, cloudy.

RABBIT III.

Inoculated in leg. *Given serum.* On twelfth day one inguinal gland felt. Killed on fifty-fourth day. No signs of tuberculosis at site of inoculation. One or two glands found enlarged in the left leg, but no caseation elsewhere. Positive evidence of presence of tuberculosis not found. Cultures, sterile. Microscopical examination. Organs, cloudy.

RABBIT XII.

Inoculated in leg. On twenty-first day a small hard papule at site of inoculation. Killed on forty-fourth day. Inflammatory infiltration with caseation was found along the track of the inoculation, film from which gave moderate numbers of tubercle bacilli. Three or four retroperitoneal glands on the left side were enlarged and appeared to contain minute tubercles, films, however, did not reveal the bacillus. A few minute pearly tubercles were found in the mesentery along the course of the vessels. One or two mesenteric glands slightly enlarged.

Microscopical examination. Site of inoculation: Muscle fibres swollen, cloudy, dissociated, and disintegrated. Considerable caseation with abundant lymphocytes. Epithelioid cells were rather more numerous than in the case of the pigs.

RABBIT IV.

Inoculated intraperitoneally. Killed fifty-first day. Small caseous mass at site of inoculation. Numerous minute pearly tubercles noted on posterior part of peritoneum low down; also in lesser omentum and over stomach. Liver contained scanty pin-point tubercles. Lungs contained fairly numerous caseous tubercles the size of millet seeds. Smears from the lung and omentum gave B. Tuberculosis. Culture from blood, sterile.

Microscopical examination. *Lung*: Several miliary tubercles composed chiefly of epithelioid cells with rare lymphocytes. No caseation nor fibrosis. *Spleen*: hyperplasia of follicles. *Liver*: Contained miliary tubercles of small size, composed chiefly of epithelioid cells with a few lymphocytes at the periphery.

RABBIT XI.

Inoculated intraperitoneally. *Given serum.* Died on forty-first day. Much emaciated. The base of the left lung was rather reddened and contained a large miliary tubercle. A smear from this gave the specific bacillus. A few whitish miliary foci found elsewhere in the lung.

Microscopical examination. *Lung*: Showed several rather diffuse areas of inflammatory infiltration composed of lymphocytes and epithelioid cells. No caseation nor fibrosis. *Spleen*: Slight hyperplasia, contained numerous phagocytes with blood pigment. Other organs negative. This rabbit apparently died from the effect of the inoculations which had brought about some hæmolysis.

RABBIT VII.

Inoculated in leg. On twenty-first day a very small papule felt at site of inoculation. Killed on fifty-fifth day. Abscess with puriform matter and numerous tubercles at site of inoculation, containing numerous tubercle bacilli. One or two mesenteric glands enlarged. Culture from blood, sterile.

Microscopic examination. *Site of inoculation*: Caseous tuberculosis with

rather numerous epithelioid cells, lymphocytes and polymorphonuclears. One or two giant-cells present. *Mesenteric gland* showed simple hyperplasia.

RABBIT V.

Inoculated in leg. *Given serum.* On twelfth day two glands enlarged in left inguinal region and one on the right. Killed on fifty-fifth day. A collection of tubercles found on the fascia of the left leg at site of inoculation, extending up the leg along the lymphatics. Rather dry. One retroperitoneal and two mesenteric glands enlarged.

Microscopical examination. All organs normal, or at most cloudy. Cultures from blood, sterile.

RABBIT VIII.

Inoculated intraperitoneally. On twenty-first day slight induration at site of inoculation. Killed on the fifty-first day. Infiltration the size of a pea at the site of inoculation which gave B. Tuberculosis. The psoas muscle on the right side inflamed, reddened, and on cutting into it it appeared caseous. Numerous pearly miliary tubercles scattered over peritoneum, mesentery, and omentum. Diaphragm showed a few miliary tubercles. A few retroperitoneal glands enlarged and caseous. A few rather large tubercles in the lower lobe of the right lung; one or two in right. Possibly a few minute tubercles in the liver. Spleen enlarged, but not visibly tuberculous. One or two mesenteric glands enlarged. A smear from the abdominal wall and also from the spleen gave the B. Tuberculosis. Culture from blood, sterile; from retroperitoneal gland, staphylococcus.

Microscopical examination. *Lung*: one or two small miliary foci composed of lymphocytes and epithelioid cells, without caseation. Small round-celled infiltration in the septa. *Spleen*: Congested, hyperplasia of follicles. *Liver*: A few minute collections of lymphoid cells with slight fatty degeneration. *Section of Wound*: Chronic granulation, with fragmentation and swelling of the muscle fibres.

RABBIT X.

Inoculated intraperitoneally. *Given serum.* On twenty-first day slight induration at the site of inoculation. Died on forty-seventh day. Large subcutaneous abscess in right flank caused by the inoculations. All organs found normal, except for congestion or cloudiness.

It was found in the course of this experiment that after the injection of the bacilli the average temperature of the animals was raised one degree. The average temperature of all the animals, both pigs and rabbits, was 102.52° before inoculation; after, it was 103.41° in those animals not receiving serum and 103.62 in those given it. In the case of the control animals that were given serum alone (Nos. VI and IX.), the temperature in one was only slightly elevated, in the other normal. We may thus conclude that the injection of the serum had no effect on the temperature curve. With regard to the weights the result was different. The animals receiving serum lost 22.27% of their body weight; those not receiving it lost only 10.45%. As a rule rabbits inoculated

with tuberculosis preserve their nutrition surprisingly well until towards the last when they go down hill rather rapidly. The injection of the serum, although given in less than half the quantity employed in the first instance still caused considerable local disturbance, and this was aggravated by the animals scratching themselves so that the loss of weight is no doubt to be attributed to the interference with their feeding and the general irritation.

In comparing the results I found, as was expected, that the guinea-pigs are much more susceptible to tuberculosis than are rabbits, losing weight rapidly from the first and presenting marked lesions when killed. These facts led me to keep the rabbits under observation some three weeks longer, in the hope that thus the resulting disease would be more pronounced. This however did not prove to be the case.

After a careful consideration of the extent and nature of the lesions produced in the pigs it could not be said that the injection of the goat serum had the slightest effect in inhibiting the action of the bacilli. The results in the case of the rabbits were rather more promising. The most marked difference was found in rabbits III. and XII. Number three which had been given serum presented no positive appearance of tuberculosis, while its mate, number twelve, presented caseation at the site of inoculation and tubercles on the peritoneum. On the whole the lesions were slightly more marked in the case of the rabbits not receiving the serum. In corroboration of this finding may be cited the results of the first experiment where the only two animals that developed tuberculosis were those that had not been given serum. It is of course hazardous to draw too positive conclusions from such a small number of animals but it would appear so far as we have gone that normal goat serum does have a slight retarding effect on the progress of tuberculous infection. Whether this action is specific or not is another question. Recent work has shown that the serum of other animals, such as the dog, the ass, and the horse, as well as normal saline solution possess similar properties.

The Effects of Serum of Immunized Goats.

Having drawn this conclusion it was thought advisable to attempt to confer upon the serum more active antitoxic properties. The method adopted was based on that employed in the production of diphtheria antitoxin, namely the introduction of the toxins of the bacillus into the system of an animal until it was immune to the effects, and then using its serum as a curative agent. As has been pointed out most of the work on these lines has proved to be a failure or at most has had a very limited meed of success. This is possibly due, at least in part, to the

fact that the toxins and extracts of the tubercle bacillus used for immunizing purposes have been obtained by heat or by various chemical processes so that they do not represent the full toxic properties of the bacillus. To obviate this objection Koch's new tuberculin (Bacillen-emulsion) was employed. Perhaps a word or two of explanation as to the nature of this substance may not be out of place at this juncture.

Koch takes a definite weight of tubercle bacilli, filters them from all culture fluid, grinds them up with two hundred parts of 1/50 normal soda solution, and then centrifugalizes. He then pours off the supernatant fluid, adds weak acid to the residue until only slightly alkaline, and finally dilutes with a standard weak solution of carbolic acid and salt to the extent of one to three thousand. Glycerine is also added, and the final emulsion represents five milligrammes of pulverized bacilli in every cubic centimetre. (Deutsche med. Woch., Nov. 28, 1901). The injection of this into tuberculous persons brings about a rise of temperature of one and a half to two degrees centigrade. The dose of the first injection is 0.0025 milligramme rapidly increased two or five-fold until the reaction appears.

To obtain convenient amounts for injection, the bacillus emulsion was diluted according to Koch's directions with a standard diluting solution containing 0.8% sodium chloride and 0.5% carbolic acid.

Three strong healthy goats were subjected to the injection of the bacillus emulsion in gradually increasing amounts, the whole procedure extending over about seven months. The reason for spreading the injections over so long a period is that it had been found by Maragliano and others that the animals stand it better and the results are more satisfactory. It was determined beforehand by culture experiments that the emulsion was sterile. The injections were given subcutaneously in the neck under strictly aseptic conditions once a week until towards the end of the allotted period. Previously, however, the normal temperature for the goat was ascertained. The amount of the emulsion injected was at first .0025 milligrammes repeated once a week for three weeks and cautiously increased until at the end of three months the goats were receiving 0.015 milligrammes. Subsequently the amount injected was doubled each week, until at the end of seven months 15 milligrammes was reached. After the first three months also the temperature before inoculation was taken as well as afterwards, twice in the following twenty-four hours. The normal temperature of the goat varies between 101 and 103 degrees Fahrenheit. In only one case did the injection (of 10 mmg.), cause a rise of temperature from 102° to 103° and 3-5ths, but this was only 3-5ths of a degree above the maximum normal variation. The subsequent injection was lessened to 7.5 mmgs., and then again increased. During the last few weeks while

such large amounts were being employed the injections were only given once in from ten to fourteen days. After the animals were considered immune to the emulsion a period of three weeks was allowed to elapse, until all excess of the toxin should have been eliminated from the system. One of the goats was then bled from the jugular with the same precautions as before adopted and the serum used for the purposes of the experiment. Tested by the Arloing-Courmont method as to its powers of agglutinating a homogeneous culture of the tubercle bacillus (kindly furnished me by Prof. Courmont), it gave a positive reaction in a dilution of one to fifty.

This power of agglutimation might, no doubt, have been greatly increased, as has been shown by Koch, but it was deemed sufficient for the immediate purposes of the experiment.

Experiment III.

In carrying out the third experiment I have laboured under considerable difficulties. Owing to the great disturbance caused by the injection of the serum in guinea-pigs it was thought better to use rabbits exclusively. Ten rabbits were taken, their temperature was noted daily for a week to establish a normal average, and their weight was recorded. They were then grouped in pairs according to their weight. Four were injected intravenously through the auricular vein; four intraperitoneally; and two in the left leg, with one half c. cm. of an emulsion of a mild tubercle bacillus in saline solution standardized as before. One member of each pair then received one c. cm. of the fortified goat serum. Unfortunately, after the experiment was well started, rabbit septicæmia broke out in the hutches and about half of the animals had to be replaced. At the end of a month several of the remaining animals were killed but it was found that the germ was not virulent enough to produce characteristic lesions. The animals were therefore reinoculated with the same quantity of an emulsion made from a mild germ received from Dr. DeSchweinitz, of the Bureau of Animal Industry, Washington. In addition two other rabbits were inoculated in the anterior chamber of the eye, affording a convenient means of watching the progress of the tuberculous infection. At the end of another month four rabbits were killed and again no lesions were discovered, a condition of things that was a little surprising when it was found that the disease progressed steadily although slowly in the case of those inoculated in the eyes. The results of more than two months' work was almost nil, although it served to indicate the effect produced by the antitoxic serum on the healthy organism. The average temperature before inoculation of the rabbits which did not receive serum was 102.9° and the average weight 1,865 grms. After the injec-

tion of the tubercle germs the average temperature was 102.7° and the weight 1,878 grms. The average temperature before inoculation with tuberculosis of the rabbits that did receive serum was 103.2° and the average weight was 1360 grms.; after inoculation with tuberculosis and after receiving antitoxic serum the average temperature was 103.2° and the weight 1673. Thus, as the culture inoculated was innocuous, the conclusion is that the antitoxic serum had no effect on the temperature while it apparently stimulated nutrition as the animals receiving it had markedly increased in weight, and in truth appeared in fine condition. This latter result, so different from that of the first two experiments, is explained from the fact that by a modification of the method the injections produced but little local disturbance, and the amount of irritation was reduced to a minimum. Finally as the experiment had to be concluded rather hastily, six guinea-pigs were taken, their normal temperature ascertained, and they were grouped in pairs as before according to weight. Two were inoculated in the left leg with a standardized emulsion of relatively mild bacilli (one c. cm.), and the remaining four intraperitoneally with the same amount. One member of each pair was given one c. cm. of antitoxic serum subcutaneously every second day. Numbers III. and VI., inoculated in the leg, died on the second day of the experiment, and presented no evidences of tuberculosis. Number IV. died on the ninth day and its mate was killed on the eleventh. Numbers I. and V. were killed on the fourteenth day.

Autopsy protocols: —

GUINEA-PIG I.

No signs of tuberculosis at the site of inoculation in the abdominal wall. No peritonitis. Two retroperitoneal glands on the left side were slightly enlarged but not caseous. Films from these did not show the bacillus tuberculosis. *Spleen*: Slightly enlarged and containing fair numbers of small greyish dots resembling early tubercles; films from the spleen, however, did not reveal the specific bacillus. A few small pearly nodules of greyish colour seen in the great omentum. A small yellow streak was seen in the *liver* not unlike a tubercle, but a smear from this did not show the tubercle bacillus.

Microscopical examination. *Great omentum*: The greyish dots referred to proved to be early tubercles. *Lung*: Slight bronchitis and peribronchitis. *Liver*: Cloudy. *Spleen*: Marked hyperplasia of the Malpighian bodies; no obvious tuberculosis. *This animal had been given serum.*

GUINEA-PIG V.

Mate of the last, receiving no serum. No signs of tuberculosis at site of inoculation in the abdominal wall. Two small retroperitoneal glands were in evidence, not caseous. One tubercle on right *testis*. A few mesenteric glands were slightly enlarged. *Spleen* much enlarged and full of whitish-grey

dots the size of pin-heads resembling tubercles. Smears from the spleen gave tubercle bacilli.

Three isolated tubercles the size of hemp-seeds noticed in the liver. Films from these showed the specific bacillus. The *great omentum* was notably thickened, being converted into a transverse cord of firm gelatinous appearance. The pleural cavities contained a fair quantity of rather blood stained fluid. In this case the amount of tuberculosis was greatly in excess of that in the last animal.

GUINEA-PIG II.

Given serum. Slight redness and œdema at the site of the injection of the serum. No signs of tuberculosis at the site of inoculation in the abdominal wall. Two retroperitoneal glands near the pelvis swollen, but not caseous; films gave a few tubercle bacilli. Some minute pin-point nodules of pearly grey appearance were found in the *omentum.* Two larger nodules also found in the omentum, one of which was caseous. Other organs normal.

Microscopical examination. *Abdominal wall*: Considerable extravasation of leucocytes about the blood-vessels. Infiltration between the muscle fibres of leucocytes and considerable numbers of epithelioid cells. Muscle-fibres cloudy. No caseation. *Retroperitoneal gland*: Hyperplastic, but not caseous. *Liver*: Fatty, one or two minute areas composed of, in the main, clear mononuclear cells, resembling epithelioid cells. *Spleen*: Much congested with hyperplasia of the Malpighian follicles; no caseation. *Kidney*: Normal. The nodules in the *great omentum* proved to be early tubercles.

GUINEA-PIG IV.

Two glands enlarged but not caseous under the skin near the site of the inoculation, with congestion of the vessels in the neighbourhood. One retroperitoneal gland on the left side near the pelvis considerably enlarged and caseous. A film from this gave the B. Tuberculosis. A few mesenteric glands near the cœcum enlarged but not caseous. In the *great omentum* were numerous small gelatinous tubercles and caseous foci. Other organs free.

Microscopical examination. *Liver*: Congested and cloudy. *Kidney*: Cloudy. *Lung*: A few small well defined rounded areas about the vessels composed mainly of cells of epithelioid type, but with a few leucocytes; no caseation. *Spleen*: Considerable blood-pigment noticed. Hyperplasia of the Malpighian follicles. *Retroperitoneal gland:* Fairly extensive central caseation. *This animal had not been given serum.* Comparing this animal with its mate (No. II.), the amount of tuberculosis was notably greater, and this was even more marked when we take into account that the duration of the disease was two days less.

While this experiment was in progress the two rabbits that had previously been inoculated in the anterior chamber of the eye were kept under observation. One apparently had received some secondary infection at the operation as the eye was very rapidly destroyed and no safe conclusions could be drawn from it. The other proved more satisfactory however. For about two weeks the small caseous mass in the anterior chamber resulting from the injection slowly enlarged to about twice its original size. With this there was consider-

able swelling and injection of the iris with exudation and marked conjunctivitis. One c. cm. of the fortified serum was then given every third day. Following upon this the acute iritis and conjunctivitis subsided, and during the next three weeks that the animal was kept under observation while the disease undoubtedly progressed and subsidiary tubercles formed, there were no evidences of acute trouble, and the progression of the tuberclosis was somewhat slow and indolent.

With regard to temperatures, the average of all the pigs was 102.4° before inoculation. After inoculation the average of those receiving serum was 102.3°; of those not receiving it, 102°.

Conclusions.

From these various results it would look as if the injection of the antitoxic serum exercised a certain amount of restraining influence upon the extent and development of the disease although it is equally clear that it was not powerful enough to neutralize the infection or prevent its extension. Under ordinary circumstances I would hesitate to draw these conclusions from such a small series of animals were it not for the fact that my results are in perfect accord with work previously done on somewhat analogous lines. As a result of this study, taken in the light also of the results of other observers, I am led to the following conclusions:—

(1) That normal goat serum when injected into guinea-pigs and rabbits is practically innocuous, only rarely producing any hæmolysis.

(2) When injected with care it appears to stimulate nutrition rather than otherwise.

(3) Normal goat serum possesses a slight amount of antitoxic power against tuberculosis in rabbits.

(4) This natural antitoxic power may be considerably increased by injecting the goat with gradually increasing doses of Koch's New Tuberculin (Bacillenemulsion) until immune to its effects.

(5) Antitoxic serum produced in this way has some power in retarding tuberculous processes, although it is not strong enough to cure them.

(6) The injections of the antitoxic serum have no effect on temperature.

I believe, therefore, that it is possible to prepare an antitoxic serum for use in tuberculosis that will in a notable degree retard the disease in certain of the lower animals. Whether we shall be able to increase its power so as to bring about cure is another matter. In the case of the protective serum I have produced I did not expect even such

good results as I obtained, for the reason that its agglutinative power was comparatively low (1—50) and it was possible to have increased this enormously. Possibly the serum of a goat treated by the tuberculin to saturation would give still better results. There would, however, be a limit to this procedure for the glycerine in Koch's emulsion would prove toxic when injected in any amount, producing hæmoglobinuria. Some method would therefore have to be devised whereby all the products of the tubercle bacillus could be injected without any foreign substances. In my opinion the various antituberculosis sera that have hitherto been produced have very questionable clinical value when applied to human beings. Of course after the announcement of any new curative agent there is always an outcry in its favour, but, in the case of tuberculosis, serum after serum has been placed upon the market only to be weighed in the balances and found wanting. The only serum that is still being used is that of Maragliano, and he is so convinced of its utility that an institute has recently been established in Italy for the treatment of tuberculosis by his method, to which he supplies serum gratis. The profession, however, appears to be strongly sceptical, for there is no rush to his laboratory from all parts of the world such as there was when Koch's ill-starred tuberculin was first announced. Maragliano's reported results, namely sixty per cent or thereabouts of improvements, are not much in advance of the figures furnished by any first class sanatorium, such as the Saranac Lake, Loomis, Muskoka, and Gœrbersdorf institutions, which are from forty to sixty per cent of cures in the early stages. It is moreover very difficult to estimate the value of any curative agent in the case of such a variable and insidious disease as tuberculosis. Many cases do well when placed in suitable surroundings with proper care and diet without drugs, and the disease is notoriously liable to unexpected remissions. The results of the serum treatment are not so good that we can yet abandon the attitude of expectant hope, nor should we pause in our attempts to obtain a still more potent serum. It may indeed well be that we have reached the possible limit of efficacy in the sera prepared by the methods hitherto adopted, and Koch is quite possibly right when he says that immunity to the action of the toxic products of the tubercle bacillus does not necessarily mean immunity to tuberculosis. We probably need some serum powerful enough to destroy the bacillus in the tissues or which, perhaps, will stimulate the body cells to elaborate a germicidal substance. The germicidal properties of the sera hitherto prepared do not appear to have been accurately observed and the subject will bear further study. Possibly advances in this direction will have to be made on the lines of Behring's recent work, who has

succeeded in producing immunity in calves by injecting them with an attenuated human bacillus. If not, the problem will have to be attacked on quite different lines. We are confronted with a problem of no ordinary magnitude as every one will readily admit.

In conclusion I wish to express my thanks to the Hon. E. H. Bronson, of Ottawa, whose public spirit and generosity have made this research possible; to Dr. H. M. Kinghorn of Saranac Lake, and Dr. H. Wolferstan Thomas of Montreal, for cultures supplied; and to Professor J. G. Adami for many valuable hints during the progress of the investigation and his kindness in presenting this paper.

BIBLIOGRAPHY.

1. Beretta. On the use of Dog's Serum in the Treatment of Tuberculosis. British Med. Journ., 1891, II. 1041.
2. Bardet. Rapport sur un travail presenté par M. le docteur Bernheim: "Transformation du sang de chèvre et tuberculose," Bull. et mém. Soc. de thérap. Paris, 1891, 237.
3. Héricourt et Richet. Nouvelles observations sur la transfusion du sang de chien pour obtenir l'immunité contre la tuberculose.
   Etudes expérimentales et clin. s. la tuberculose. (Verneuil et al.) 1891, III., 139.
4. Ortigosa. Las inyecciones de suero de sangre de perro en los tuberculosos. Cron. méd., Valencia, 1891, XIV., 142.
5. Héricourt et Richet. De l'immunité contre la tuberculose par les transfusions de sang de chien tuberculisé. Compt. rend. Soc. de biol., Paris, 1890, 9, s. II., 630.
6. Bertin et Picq. De la transfusion du sang de chèvre comme traitement de la tuberculose. Compt. rend. Soc. d. biol., Paris, 1890, 9. s. II., 719.
7. Lépine. Sur l'application à l'homme de la methode de traitement de la tuberculose de MM. J. Héricourt et C. Richet. Semaine méd., Paris, XI., 21.
   Also Tribune méd., Paris., 1891, 2 s., XXIV., 144.
8. Héricourt, Langlois, et Saint-Hilaire. Effet thérapeutique des injections de sérum de chien (hæmocyne) chez l'homme dans le cours de la tuberculose. Compt. rend. Soc. de biol., Paris, 1891, 9 s., III., 45.
9. Grancher. Les injections de sérum de chien et de chèvre aux tuberculeux. Union méd., Paris, 1891, 3 s., LI., 461.
10. Héricourt et Richet. Nouvelles expériences sur les effets des injections de sérum dans la tuberculose. Compt. rend. Soc. de biol., Par., 1891, 9 s., III., 335.
11. Falcone. Sulla terapia della tubercolosi mediante le iniezione di siero di sangue di cano. Progresso med., Napoli, 1891, V., 417.
12. Héricourt et Richet. Influence sur l'infection tuberculeuse de la transfusion du sang de chiens vaccinés contre la tuberculose. Compt. rend. Acad. d. sc., Paris, 1892, CXV., 842.
13. Bernheim. Immunization tuberculeuse et sérothérapie. Congr. p. l'étude de la tuberculose, Paris, 1893, III., 286.

14. Babès. Essais de traitement de la tuberculose par l'injection du sérum de chiens rendus réfractaires à cette maladie. Congr. p. l'étude de la tuberculose, 1893, Paris, 1894, III., 255.
15. Szekely. The cure of Tuberculosis with serum. Ujabb gyogyszer. es gyogymod, Budapesth, 1895, 9.
16. Hovent. Le traitement sérothérapique de la tuberculose. Scalpel, Liège, 1895-6, XLVIII, 127.
17. Maragliano. La cura della tubercolosi col siero antitubercolare. Cron. d. clin. med. di Genova, 1893-5, 339.
18. Semmola (On Maragliano's method). Progresso med., Napoli, 1895, IX., 213.
Ibidem., 1896, XII., pt. 1, 206.
19. Maragliano. La sieroterapia nella tuberculosi. Riforma med., Napoli, 1895, XI., pt. 4, 207.
Also: Ibidem., 1896, XII., pt. 1, 206.
20. Boinet. Traitement de la tuberculose humaine par le sérum de sang de chèvre inoculée avec de la tuberculine. Compt. rend. Soc. de biol., Par., 1895, 10 s., II., 543.
Also: Gaz. d. hôp. de Paris, 1895, LXVIII., 875, and Congr. franc. de méd., 1894, Par., 1895, I., 538.
21. Carrien. De l'injection de lymphe du chien dans le traitement de la tuberculose. Atti. d. XI. Congr. med. internaz., Roma, 1894, III., med. int., 128.
22. Cale. Serotherapy in bone and joint Tuberculosis. Med. Rev., St. Louis, 1895, XXXII., 219.
23. Dupaquier. Serum therapy of Tuberculosis. New Orleans Med. and Surg. J., 1895-6, n.s., XXIII., 136.
24. Maragliano. Rév. de la tuberculose. Juillet, 1896.
25. Babès. Zeitschr. f. Hygiene. Bd. XXIII., Hft. 3.
26. Lemen (Paquin's method). New York Med. Journ., 1895, LXII., 337.
27. Broca et Charrin. Traitement des tuberculoses cutanées par le sérum de chiens tuberculeux. Compt. rend. Soc. d. biol., Par., 1895, 10 s., II., 605.
28. Héricourt et Richet. A propos de la sérothérapie dans la tuberculose. Compt. rend. Soc. d. biol., Par., 1895, 10 s., II., 15.
29. Lemiere. La sérothérapie de la tuberculose. Journ. d. sc. méd. de Lille, 1895, II., 208.
30. Paquin. Treatment of Tuberculosis by injections of Immunized Blood Serum. Journ. Amer. Med. Assoc., 1895, XXIV., 842.
Ibid., XXVI., 668.
31. Loeb, H. W. (Paquin's method). New York Med. Journ., 1895, LXII., 425.
32. Rappin. Préparation de sérums contre la tuberculose. Gaz. méd. de Nantes, 1894-5, XIII., 109.
33. Semmola (Maragliano method). Nice-med., 1895-6, XX., 25.
34. Simonena (Maragliano method). Gac. med. catal., Barcelona, 1895, XVIII., 561.
35. Ribas Perdigo (Maragliano method). Gac. med. catal., Barcelona, 1895, XVIII., 706.
36. Héricourt et Richet. Expériences sur la sérothérapie dans la tuberculose. Compt. rend. Soc. de biol., Par., 1895, 10 s., II., 13

37. Redon et Chenot. Sérothérapie dans la tuberculose. Compt. rend. Soc. d. biol., Par., 1895, 10 s., II., 493.
38. Héricourt. Le sérum du chien dans le traitement de la tuberculose. (C. Richet) Physiol. trav. du labor. 8, Par., 1895, III., 1358.
39. Héricourt et Richet. Effets des injections du sang d'animaux tuberculisés, Ibid., 317.
40. Mariani. La sieroterapia nella tubercolosi. Bull. d. Soc. Lancisiana d. osp. di Roma, 1895-6, XVI., 27.
41. Babès et Proca. Sur la sérothérapie de la tuberculose. Compt. rend. Acad. d. sc., Par., 1896, CXXII., 37.
42. Maragliano. Quattro centurie di casi trattati col siero antitubercolare. Gazz. med. lomb., Milano, 1896, LV., 151.
43. Crescimanno (Maragliano method). Riforma med., Napoli, 1896, XII., pt. I., 705.
44. Vigenaud (Maragliano method). Bull. et mém. Soc. méd. d. hôp. de Paris, 1896, 3 s., XIII., 461.
45. Hayden. Report of Results and Recoveries obtained by the use of anti-tubercle serum. Journ. Amer. Med. Ass., 1896, XXVI., 965.
46. Bernheim. Immunisation tuberculeuse et sérumthérapie. Compt. rend. Soc. de Biol., Par., 1896, 10 s., III., 291.
47. Paquin. Serotherapy in the Treatment of Tuberculosis. Journ. Amer. Med. Ass., 1896, XXVI., 760.
48. Maragliano. La sieroterapia nella tubercolosi. Clin. med., Firenze, 1896, II., 33.
49. Maragliano. Proposito della communicazione de Babès sulla sieroterapia nella tubercolosi. Gazz. d. osp., Milano, 1896, XVII., 334.
50. Cattaneo (Maragliano method). Gazz. d. esp., Milano, 1896, XVII., 331.
51. Fasano. La sieroterapia della tuberculosi. Gazz. d. osp., Milano, 1896, XVII., 271.
52. Chamberlin. The Treatment of Tuberculosis with the Antitubercle Serum. Virginia Med. Month, Richmond, 1895-6, XXII., 1266.
53. Shropshire (Paquin method). New York Med. Journ., 1896, LXIII., 15.
54. Bacque (Maragliano method). Limousin med., Limoges, 1896, XX., 18.
55. De Bernardi (Maragliano method). Gazz. d. osp., Milano, 1896, XVII., 61.
56. Maffucci und Di Vestea. Experimentelle Untersuchungen ueber die Serumtherapie bei der Tuberkelinfektion. Contralb. f. Bakter., Jena, Abt. I., 1896, XIX., 208.
Also: Sémaine méd., Par., III., 545.
57. Maragliano. Il siero antitubercolare e la sua antitossina. Trans. Presse med., Par., 1896, 273.
Also: Berl. klin., Woch., 1896, XXXIII., 773.
58. Oliva (Maragliano method). Riv. veneta di sc. med., Venezia, 1896, XXV., 383.
59. Paquin. Tuberculosis and its Treatment. Med. Rev., St. Louis, 1896, XXXIV., 25.
60. Paquin. Serotherapy in the Treatment of Tuberculosis. St. Louis Clinique, 1896, IX., 386.
61. Paquin. The Modern Treatment of Tuberculosis. New York Med. Journ., 1896, LXIV., 548.
62. Taylor (Paquin method). South. Califor. Pract., Los Angelos, 1896, XI., 368.

63. Mitchell (Paquin method). North Amer. Pract., Chicago, 1896,, VIII., 400.
64. Bandiera (Maragliano method). Bost. Med. and Surg. Journ., 1896, CXXXIV., 10.
65. Tommasoli (Maragliano method). Giorn. ital. d. mal. ven., Milano, 1896, XXXI., 615-17.
66. Marcantonio. Proprieta terapeutiche del siero di sangue e dell'estratto idro-alcoolico di visceri di cane sottoposto ad uno speciale trattamento d'immunizzazione alla tubercolosi. Supp. al Policlin., Roma, 1896-7, III., 680.
67. Paquin. Specific Medication in Tuberculosis of Man and Beast. Journ. Amer. Med. Ass., 1897, XXVIII., 220.
68. Taylor (Paquin method). South. Califor. Pract., Los Angelos, 1897, XII., 57.
69. Niemann. Ueber Tuberkuloseheilserum. Münchener med. Woch., 1897, XLIV., 59.
70. Coster. Action du sérum antituberculeux sur une tumeur fibro-tuberculeuse de la face. Presse méd. belge, Bruxelles, 1897, XLIX., 114.
71. Giovanelli. Contributo alla sieroterapia anti-tubercolare. Gazz. d. osp., Milano, 1897, XVIII., 517.
72. Scarsi (Maragliano method). Gazz. med. lomb., Milano, 1897, LVI., 165.
73. Fileti (Maragliano method). Giorn. ital. d. mal. ven., Milano, 1897, XXXII., 89.
74. Hager (Maragliano method). Münchener med. Woch., 1897, XLIV., 853.
75. Lumbau (Maragliano method). Arch. internaz. di med. e. chir., Napoli, 1897, XIII., 198.
76. Paquin. Further cases treated by Antitubercle Serum. Journ. Amer. Med. Ass., 1897, XXIX., 98.
77. Parker. The Use of Normal (horse) Serum in the Treatment of Tuberculosis. Virgin. Semi-Monthly, Richmond, 1897-8, II., 234.
78. Anderson. My experience with Paquin's Antitubercle Serum. Journ. Amer. Med. Ass., 1897, XXIX., 369.
79. Hinsdale. Remarks on the treatment of Tuberculosis by the antitubercle Serum. Bost. Med. and Surg. Journ., 1897, CXXVII., 416.
80. De Schweinitz and Dorset. Some Products of the Tuberculosis and the Treatment of experimental Tuberculosis with Antitoxic Serum. New York Med. Journ., 1897, LXVI., 105.
Also: Trans. Amer. Ass. of Phys., 1897, XII., 205.
81. Richardson. Serum Treatment of Tuberculosis. Nat. Med. Rev., Washington, 1897-8, VII., 286.
82. Silvestrini. Contributo sperim. alla studio della vaccinazione e della sieroterapia nell'infezione tubercolare. Settimana med. de. sperimentale, Firenze, 1897, LI., 461.
83. Ferran. Investigaciones sobre la suérotérapia en la tuberculosis. Independ. med., Barcelona, 1896-7, XXVIII., 517.
Also: Gaz. med. catal., Barcelona, 1898, XXI., 65.
84. Reffan. Investigaciones sobre la sueraterapia en la tuberculosis. Rev. med. de Sevilla, 1897, XXIX., 161.
85. De Schweinitz. Some results in the Treatment of Tuberculosis with Antituberculosis Serum. Nat. Med Rev., Wash., 1897-8, VII., 281.
86. Nascimbene (Maragliano method). Gaz. med. lomb., Milano., 1898, LVII., 67-9.

87. Pacialli (Maragliano method). Bull. d. sc. di Bologna., 1898, 7 s., IX., 81
88. Raimondi e Moscucci (Maragliano method). Acad. d. fisiocrit in Siena, 1898, 4 s., IX., 155.
Also: Arch. ital. di clin. med, Milano, 897, XXXVI., 372.
89. Serra. Sieroterapia antitubercolare. Raccoglitore, Forli, 1898, 6 s., 1, 281.
90. Ulrich (Maragliano method). Hosp.-Tid., Kjbenh., 1898, 4 R., VI., 629.
Also: Therap. Monatschr., Berlin, 1898, XII, 547.
91. Edwards. Antitubercle Serum in Tuberculosis. Med. Rev., St. Louis, 1898, XXXVII., 243.
92. Prioleau (Paquin method). Journ. Amer. Med. Ass., 1898, XXXI., 687.
Also: New York Med Journ., 1897, LXV., 872.
93. Lemen. Three Years of Serum Therapy in Tuberculosis. New York Med. Journ., 1898, LXVII., 672.
94. Maksutoff. Immunization and Serumtherapy in Tuberculosis. Bolnitsch. gaz. Botkina, St. Petersburg, 1898, IX., 1329: 1402: 1458.
95. Berlioz. Traitement de la tuberculose par les sérums médicamenteux. Dauphiné méd, Grenoble, 1898, XXII., 145.
Also: Bull. gen. de thérap. Par., 1899, CXXXVII., 113.
96. Laudouzy. Rapport sur l'emploi des sérums et de toxine dans le traitement de la tuberculose. Rév de thérap. med.-chir., Par., 1898, LXV., 505.
Also; Presse Méd., Paris, 1898, II., 49.
97. Waxham. The Serum Treatment of Tuberculosis. J. Amer. Med. Ass., 1898, XXX., 859.
98. Denison. The Antitoxin Treatment of Tuberculosis or the direct (tuberculin preparations) versus the indirect (animal serum) method of immunization against Tuberculosis. J. Amer. Med. Ass., 1898, XXX., 290.
99. Dunwody. Tuberculosis permanently cured by Serum. Tri-State Med. J. and Pract., St. Louis, 1898, V., 6.
100. Potter. The Serum Therapy of Tuberculosis. Phil. Med. J., 1898, I., 383.
101. Kolb (Maraglano method). Vereinsbl. d. pfälz. Aertze, 1898, XIV., 8.
102. Peron. Sérothérapie tuberculeuse naturelle chez l'homme. Compt. rend. Soc. d. biol., Par., 1898, 10 s., V. 974.
103. Crescimanno (Maragliano method). Sieroterapia. Roma, 1898, II., 126.
104. Maragliano. La sieroterapia vel trattamento della tubercolosi. Cron. d. clin. med. di Genova, 1898-9, V., 225.
105. Trudeau and Baldwin. A Resume of Exper. Studies on the Prep. and Effects of Antitoxic Serum in Tuberculosis. Trans. Ass. Amer. Phys. Phila., 1898, XIII., 111.
Also: Amer. Journ. Med. Sc., 1898, n.s. CXVI., 692; and 1899, n.s. CXVII., 56.
106. Parker. Serum Therapy in Tuberculosis. Journ. Amer. Med. Ass., 1899, XXXII., 73.
107. Bridges. Report on cases treated with Paquin's Antitubercle Serum. Charlotte Med. Journ., 1899, XIV., 342.
108. Maffucci et Di Vestea. Recherches expér. sur la sérothérapie de la tuberculose. Rév. de chir., Par., 1899, XIX., 276.
109. Nauss. Tuberkulose-Immunserum und Lungenschwindsucht. Aerztl, Rundschau. München., 1899, IX., I.; 17: 33: 49: 65.

110. Stubbert. The Statistics upon Serotherapy in Tuberculosis. Med. News, New York, 1899, LXXIV., 294.

111. Editorial. Serum treatment of Tuberculosis. Journ. Amer. Med. Ass., 1900, XXXIV., 112.

112. Héricourt. La sérothérapie. Paris, Ruff, 1900, p. 336.

113. Mantovani. Contributo alla sieroterapia nella tubercolosi. Cron. di clin. med., Genova, 1900, VII., 4, 10.

114. Spicer. The Serum Treatment of Tuberculosis. Med. Fortnightly, St. Louis, 1900, XVII., 372.

115. Maragliano. Sopra alcuni studi sperimentali dei prof. Maffucci e Di Vestea sui sieri antitubercolare. Gazz. d osp., Milano, 1901, XXII., 18.

116. Banti. Legge e sieri. Riv. crit. di clin. med., Firenze, 1901, II., 217.

117. Josias et Roux. Essai sur le traitement de la tuberculose pulmonaire chez les enfants par le sérum musculaire. Bull. gén. de thérap., Paris, 1901, CXLI., 249.

118. Maragliano. Per la cura specifica della tubercolosi. Gazz. d. osp., Milano. Dec. 7th, p. 1457, 1902.

119. Piera (Maragliano method). Gazzeta Degli Ospedali e delle Cliniche. May 10, 1903.

120. Caffarene. On the Agglutinating and Antitoxic Power of Normal Horses and Horses Immunized against Tuberculosis. Gaz. degli Osp. e delle Cliniche, June 7, 1903.

II.—*Notes on Tertiary Plants.*

By D. P. PENHALLOW.

(Read May 19, 1903.)

Among the undetermined material in the Peter Redpath Museum of McGill University, my attention has been directed to a collection of fossil woods secured by the late Dr. G. M. Dawson during the progress of the survey under the British North American Boundary Commission in 1873-4. The leaf impressions belonging to the collection were studied and reported upon somewhat fully by the late Sir William Dawson, and they require but little further consideration at this time; the specimens of wood, however, were studied less critically and referred provisionally to several well known genera and species.[1] When this material came into my hands, I found that transverse sections had been cut from some of the specimens, while the great majority had not been sectioned at all. With three exceptions, the sections employed by Sir William Dawson for his diagnoses could not be found, while those which were available were found to be unsuited to the purposes of critical study, and they could not be fully identified with the hand specimens. It was therefore found desirable to commence *de novo* and by a careful selection, based upon preliminary sections, it became possible to exclude a large number of the specimens as unfit for further study, and to secure a number in which the structure was well preserved. The study of these specimens has occupied much time, but the final results as embodied in the following pages, may be regarded as accurately representing our present knowledge of these plants as presented by the stem structure. During the progress of the work it was found possible to identify nearly all the forms originally described, and to correlate them with recognized species or genera.

All the specimens were in the form of highly silicified fragments of great hardness. Some of them presented strong external evidence of structure, while others revealed structure only after sectioning. Many of the fragments were angular, showing that they had been found in place, or else that they had been broken from larger specimens, while all the smaller specimens, which were in the numerical majority, were rounded and well worn through the action of water, indicating that they had been acted upon in place for a long time, or else that they had been transported over a considerable distance.

[1] B. N. A. Bound. Comm., 1875. App. 330-331.

and, therefore, from some point farther north in the direction of the headwaters of the streams local to the region. An examination of the adjacent territory is therefore desirable.

Ranging northward and westward from near the International Boundary, there is an extensive area of 7,500 square miles which Dr. Dawson designated as the Missouri Coteau. Against the southwest side of this area there is another of about 12,000 square miles known as the Plateau of the Lignite Tertiary. These areas collectively constitute the Third Prairie Steppe, the southern face of which lies but a short distance to the north of the 49th parallel.[1] From the Plateau of the Lignite Tertiary, the Porcupine Creek flows down to the level of the Second Steppe and crosses the International Boundary at about 106 deg. west longitude. Other streams originating in the same plateau flow through the Great Valley at about the 104th meridian. As both these localities are coterminous and represent very nearly the same horizon,[2] they may be dealt with, for the purposes of the present paper, as essentially one, although as already shown,[3] the floras are slightly different. From this it will appear within the limits of probability that the water-worn fragments had their origin within the area of the Lignite Tertiary Plateau, while the others, found in place, originated near its southern face.

In his original report upon these plants, Sir William Dawson directed attention to the fact that the plants of the Porcupine Creek Group and those of the Great Valley Group are "for the most part identical with those" found common to the Fort Union Series of the United States. They are "also similar to plants collected by Dr. Richardson in the Lignite Series of the Mackenzie River, as described by Heer, ... they also approach very closely to the so-called Miocene floras of Alaska and Greenland, as described by Heer; and in their facies and in several of their species, they coincide with the Miocene flora of Europe. If we were to regard the affinities of the plants merely, and to compare them with the Miocene of other countries, and also to consider the fact that several of the species are identical with those still living, and that the whole facies of the flora coincides with that of modern temperate America, little hesitation would be felt in assigning the formation in which they occur to the Miocene period. On the other hand, when we consider the fact that the lower beds of this formation hold the remains of reptiles of Mesozoic type, that the beds pass downward into the rocks holding Baculites and Inocerami, and that a flora essentially similar is found

[1] B. N. A. Bound. Comm., 1875, 287-296.

[2] *Ibid.* App. 327.

[3] *Ibid.*

associated with Cretaceous marine animal remains both in Dakota and in Vancouver's Island, we should be inclined to assign them at least to the base of Eocene. In my judgment, any precise decision as to their geological age is premature, and it is rash to identify the beds, on the evidence of plants alone, with particular subdivisions of the tertiary elsewhere, ... but in the meantime, it is sufficient to hold that we have here a flora which in Europe would be regarded as miocene, but which in America probably began to exist at a much earlier date." [1]

In a more recent revision of the flora of this region, however,[2] this statement was subject to some modification, since "the truth appears to be that they constitute a transition from the upper part of the Cretaceous to the Eocene, and that the analogies which have been sought to be established between them and European Miocene deposits are altogether fallacious, and based upon the similarity of an American flora of early Eocene date with one found in Europe at a later period.[4] This opinion is later confirmed on the basis of data advanced by Newberry and Lesquereux, and it is accepted as established that the Porcupine Creek and the Great Valley Groups are equivalent to the Souris River beds, and that they lie above the Willow Creek Series which defines the transition from the Middle Laramie or Upper Cretaceous, to the Upper Laramie or Eocene.[3]

From a stratigraphical study of the series at Porcupine Creek and at Great Valley,[4] the late Dr. G. M. Dawson was also led to place these deposits in the Eocene. Since that time but little new evidence has been offered with respect to their age, but such as it is, it serves to confirm previous conclusions. In 1881 Mr. R. G. McConnell, of the Geological Survey, examined the entire region, and in his report published in 1882, he states that "the Porcupine Hills consist of rocks forming the upper part of the Laramie and mark the axis of a wide synclinal."[5] In a letter recently received from Mr. J. F. Whiteaves, Mr. McConnell is quoted as saying that "these beds are undoubtedly above the Willow Creek Series, and that, so far as known, they overlie it conformably."

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[1] B. N. A. Bound. Comm., 1875. App. 327-328.

[2] Trans. R. Soc. Can., I., iv., 15, 16, 1882.

[3] *Ibid.*, IV., iv., 19, 20, 1886.

[4] *Ibid.* 93-100.

[5] Rept. Geol. Surv. Can., 1882. 10C, 96C, 106C, 112C, 113C.

Taxodium distichum, Rich.

Fig. 1.

Eocene of the Great Valley and Porcupine Creek Groups; North Saskatchewan; Souris River; Red Deer River; Elko Station, Nevada; Evanston; Alaska? Carbon?

Miocene of the Similkameen River; Horse-Fly River, B.C.; John Day Valley, Oregon.

Bib. :—Trans. R. Soc. Can., VIII., iv., 1902, 51, 68.

Transverse.—Growth rings rather broad, the structure much altered by decay and pressure; the spring wood compressed to an angle of 45 degrees and details obliterated. Summer wood dense, very variable in thickness, the transition from the spring wood abrupt. Medullary rays resinous, conspicuous. Resin canals wholly wanting. Resin cells numerous and prominent; in the spring wood with dark resin masses, normally in tangential bands; in the summer wood frequently in tangential bands, chiefly appearing devoid of resin masses.

Radial.—Ray cells of one kind only, the walls thick when not reduced by decay; the terminal walls thin, straight or curved; the lateral walls with bordered pits 1-2 per tracheid, when of the latter number in radial series, oval or round, the lenticular-oblong orifice diagonal to the cell axis.

Tangential.—Rays rather high, all of one kind and uniseriate; the cells broadly oval.

Among the woods sectioned for the first (?) time was one which cannot be identified with any of the descriptions or figures given by Sir William Dawson, and it is thus possible that it escaped his notice altogether. On the other hand, the original hand specimen may have been lost, and this alternative is suggested by certain references to be noted later. The wood had evidently been subjected to extended decay, while it was subsequently brought under the influence of pressure whereby secondary alterations were developed. That the wood was also one which offered a high degree of resistance to decay is likewise apparent in the special character of the alterations effected. In the transverse section the very strongly developed summer wood has been so far altered that the secondary layers of the thick walls are greatly swollen so as to nearly obliterate the cell cavities and thereby destroy essential features of structure. Nevertheless, it is quite possible to readily establish the point of contact with the spring wood because of the lateral compression which, following decay, has forced the lines of structure over to an angle of about forty-five degrees to the normal. The medullary rays are very prominent and they may be readily followed throughout their entire course by reason of the

somewhat abundant resin they contain. Resin canals are altogether absent, but resin cells are both numerous and conspicuous. In the spring wood they are well defined by virtue of the dark resin masses which they hold, and there is reason for the belief that they fall into more or less well defined tangential bands such as constitute so characteristic a feature of Taxodium. In the summer wood, the resin cells lying along the inner face are not infrequently located in well defined bands. Throughout the greater extent of the summer wood where they are abundant, they are usually devoid of resin and are then to be recognized as empty or nearly empty cells which thereby acquire great prominence, in an otherwise reddish-yellow tissue.

The longitudinal sections were found somewhat difficult to study on account of the dislocation of parts. Nevertheless, the radial sections show the medullary rays to be devoid of tracheids; but the most significant fact for diagnostic purposes is the occurrence on the lateral walls of the ray cells, of distinctly bordered pits. These structures are 1-2 per tracheid, oval or round and with a lenticular-oblong orifice which is diagonal to the axis of the ray. When the pits are two in number, they fall into radial series. These facts point without question to the general affinities of the plant, and show that it is beyond all question one of the Taxodieæ.

In his original description of these plants, Sir William Dawson specifies Cupressinoxylon, species (*c*), which may be the same as the one now in question, as he says it approaches the wood of Taxodium or Cryptomeria, but "it may have belonged to Glyptostrobus."[1] Now, the genus Taxodium has hitherto been wholly unknown to these deposits through its wood, and to a very limited extent only through its foliage, and there is, therefore, very little to support the assumption that this is the wood of a true Taxodium except the evidence to be derived from the internal structure, and this is so similar that there seems to be little room for hesitation. On the other hand, however, the alteration of structure by decay and compression is such as to lead one to exercise caution in expressing a final opinion in a case where comparatively slight differences, readily obscured by such conditions of preservation as are here represented, might make all the difference between one genus and another. Glyptostrobus europæus is a well recognized species of the Porcupine Creek and Great Valley Series as recorded by Sir William Dawson, where it has been identified through its leaves.[2] The very close relationship between Glyptostrobus and Taxodium at once directs attention to the possibility that the wood belongs to the former, rather than to the latter genus.

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[1] B. N. A. Bound. Comm., 1875, App. 331.

[2] *Ibid.*, 328, 329.

In this connection, however, it is to be recalled that certain species of Glyptostrobus (G. horsfieldii) have been referred to Podocarpus, while the genus as a whole was transferred to Taxodium by Bentham and Kooker, and this relation is recognized in the Index Kewensis. The most recent revision, however, as given by Eichler in Engler & Prantl, still gives Glyptostrobus a distinct status as a valid genus within the Taxodieæ, whereby it is definitely separated from all relationship with Podocarpus. From this it would appear that the question now resolves itself into a choice between Podocarpus on the one hand and Taxodium or Glyptostrobus on the other.

An analysis of the characteristics of the woody structure of the common Bald Cypress has already been given, and the close similarity of the fossil has been noted. According to the usual diagnoses for the leaves, these organs are "alternate, spirally disposed, sessile, narrowly linear, acute; those of the flowering branches smaller scalelike."[1] Schimper's diagnosis for fossil representatives of the genus reads "Folia disticha, complanato-patentia, linearia, basi angustata," while for the species T. distichum miocenum we have the somewhat additional characters "basi angustatis, *breviterque petiolatis.*"[2] These characters uniformly constitute the basis for the recognition of fossil species, and they are quite distinct in certain particulars from those which are commonly held to pertain to Glyptostrobus.

Although not recorded in his list of plants from the Porcupine Creek and Great Valley, I nevertheless find in the Museum collection some badly preserved specimens of leaves of an undesignated species of Taxodium which are described as collected by Dr. G. M. Dawson during the progress of the B. N. A. Boundary Commission Survey in 1873-74, from the Upper Laramie of Porcupine Creek. A very careful examination of these specimens shows that they cannot be distinguished from other Tertiary specimens which are labelled Taxodium distichum. These latter were derived from three separate localities.

Several other specimens of Taxodium are also in the Museum collection. One lot is from the Upper Laramie of the North Saskatchewan, and was collected by Mr. Tyrrell in 1886. A second lot was obtained from the Lignite Tertiary of the Souris River by Dr. Selwyn in 1880, while the third lot was found in the Miocene of the Similkameen River, B.C. In all these cases the plant is represented by the foliage which is most beautifully preserved, and it therefore readily admits of a verification of the statement which the name implies, that the specimens cannot be differentiated from the existing Taxodium distichum to which they have been correctly referred.

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[1] Britton, Ill. Flor. N. U. S. & Can.

[2] Pal. Vég., II., 322, 323.

From this, therefore, it is clear that Taxodium distichum occurs in the Porcupine Creek and Great Valley Groups, and it is in a high degree probable that the wood and leaves belong to the same plant.

But in view of the element of doubt which still attaches to the wood on account of its state of preservation, it is necessary to examine additional evidence bearing upon Glyptostropus and Podocarpus, and to ascertain if a process of elimination will strengthen or diminish the force of the arguments in favour of Taxodium.

Schimper's diagnosis of the foliage of fossil Glyptostrobi gives "Folia spiraliter disposita, sparsa, lineari-subulata," while, for the most commonly known specific form (G. europæus) it reads "Foliis squamiformis, adpressis, basi decurrentibus, in ramulis nonnullibus vero linearibus patentibus distichis," from which it will readily be seen that the essential distinction between Taxodium and Glyptostrobus rests entirely upon the form and character of the leaf base which is narrowed and very short petiolate in the one case, and decurrent in the other, and it is just this difference which is represented in the various diagnoses of fossil species. While the genus is widely represented in Cretaceous and Tertiary rocks, especially by the well-known G. europæus, it has never enlarged beyond very narrow limits, and at the present time it is represented by only two living species (G. heterophyllus and G. pendulus), both of which are peculiar to China. In the absence of the wood of these trees, we are forced to rely upon the foliage of the fossil species which, though abundant in the same deposits, affords no conclusive evidence as to its connection with the wood now under discussion.

As already pointed out, Glyptostrobus horsfieldii has been transferred to Podocarpus where it falls in the section Dacryocarpus as the most nearly allied to Taxodium. As exhibited in P. dacrydioides,[1] the foliage presents a striking similarity to that of fossil species of Glyptostrobus, is shown by the decurrent base and by the more general features given in commonly accepted diagnoses:—"Folia diformia, alia praesertim ramulorum fertilium parva, squamiformia, conferta, saepiusque appressa, alia, ramulorum sterilium, distiche patentia, anguste, linearia v. fere subulata." A careful examination of typical specimens of Glyptostrobus in the collections of the Peter Redpath Museum abundantly confirms the resemblance thus indicated, whence it becomes necessary to submit the wood to a detailed comparison with that of the fossil. The wood selected for this purpose is that of Podocarpus machrophylla, Don., from Japan. The diagnosis is as follows:—

Transverse.—Growth rings narrow, becoming very broad towards the centre of the tree. Spring wood composing $^{11}/_{12}$ of the growth ring;

[1] Engler & Prantl, Pflanzenfamilien.

tracheids medium to small, thickish walled, passing gradually into the very thin summer wood. Summer wood of three to four tracheids as in Thuya or Cupressus; the tracheids squarish, not very thick walled, but strongly flattened in the outer row. Medullary rays numerous, distant from 2—5 rows of tracheids. Resin canals wholly wanting. Resin cells very numerous throughout the entire growth ring, more or less in tangential rows, resinous contents not prominent or massive, the color chiefly in the walls.

Radial.—Grain much contorted. Resin cells numerous and prominent, about 15 to 1.75 mm. Bordered pits on the radial walls of the tracheids medium to small, in one row, one-half the width of the tracheid, the lenticular orifice diagonal, rather open. Medullary rays of resinous color, but the resin not massive; cells all of one kind, chiefly straight; the upper and lower walls thick and variable in width, strongly but distantly pitted; the terminal walls thin, not pitted or locally thickened, straight or often strongly curved; pits on the lateral walls small, 1—2 per tracheid, when of the latter number in vertical series, the oblong orifice at right angles to the cell axis.

Tangential.—Rays very numerous and variable in height; strictly uniseriate; the cells variable in size, chiefly broadly oval or round, thick walled, not conspicuously resinous.

The characteristics thus set forth clearly establish the relations of Podocarpus to the type of Cupressus or Thuya,[1] rather than to that of Taxodium.[2] It may nevertheless be well to indicate the chief characteristics in which the latter differs from the former. The summer wood of the growth ring is almost invariably double, constituting a well defined character which, in addition to the usually great thickness of the summer wood, serves to separate the genus from all other allied types. While in Podocarpus the rays are very numerous and rarely separated by more than five rows of tracheids, in Taxodium they are distant from 2-11 rows. In radial section the resin cells are only about 2 per 1.75 mm., thus making them at least seven times less numerous (15 per 1.75 mm.) than in Podocarpus. The pits on the lateral walls of the ray cells are upwards of seven in number, lying in radial series, while in Podocarpus there is usually only one pit to each tracheid, and when there are two, they lie in vertical series with the oblong orifice also vertical.

A careful consideration of these various details brings us to the very obvious conclusion that the wood cannot be that of Podocarpus, while it may be that of Glyptostrobus. But, as the only support for the latter lies in associated leaves, while for Taxodium we have not only the associated leaves but a stem structure which is, in all essential respects that of the existing Tertiary distichum, we feel that there is ample justification for referring the wood to the latter.

[1] Taxaceae & Coniferae. Trans. R. Soc. Can., II., iv., 50.
[2] *Ibid.*, 51.

SEQUOIA LANGSDORFII, (Brongn) Heer.

Figs. 2-4.

Miocene of John Day Valley, Oregon; Mackenzie River and Horsefly River, B.C.; Green River Group, Col.

Eocene of Alaska and the Great Valley Group, N.W.T.; Fort Union Group; Porcupine Creek.

Cretaceous of Nanaimo and Port McNeil.

Bib. :—Dawson, Trans. R. Soc. Can., XI., iv., 56, 1895; Penhallow, Trans. R. Soc. Can., VIII., iv., 44, 68, 1902; Dawson, B. N. A. Bound. Comm., App. A, 331, 1875.

In his description of plants from the Great Valley Group, Sir William Dawson distinguished a wood which he assigned to the genus Cedroxylon, but he observed that it might represent the wood of Thuya interrupta which occurs in the Porcupine Creek Group, noting also that the structure resembled that of Thuya occidentalis.[1] It is probable that these observations applied in part at least, to the wood now under consideration, which cannot be distinguished from that of Sequoia langsdorfii derived from Vancouver and from the Horsefly River, B.C.[2] A revision of the original diagnosis of this species, based upon all available material, would be as follows: —

Transverse.—Growth rings medium, strongly defined. Tracheids of the spring wood squarish, large, 52 x 52 microns, the walls 14 microns thick. Summer wood of three to six tracheids in thickness, the transition from the spring wood rather abrupt. Resin cells rather numerous throughout the growth ring and scattering. Resin canals usually absent, but occasionally appearing in a rudimentary form on the outer face of the summer wood.

Radial.—Medullary rays devoid of tracheids; the parenchyma cells equal to about four tracheids, somewhat constricted at the ends; the upper and lower walls thin and entire; the terminal walls not pitted, straight or curved; the lateral walls with no recognizable structural details.

Tangential.—Medullary rays uniseriate or rarely 2-seriate in part, the oval or round cells about 31.5 microns broad.

Sequoia langsdorfii is a species which has long been known to the Tertiary of both Europe and America, where it is both abundant and of very general distribution. Until recently, however, our knowledge of it has rested entirely upon the remains of foliage and fruit, and from these data alone, it has come to be regarded by palæobotanists generally, as the prototype of the living Sequoia sempervirens. Thus, as long ago as 1869, Schimper directed attention to the very close

[1] B. N. A. Bound. Comm., App. A, 331.

[2] Trans. R. Soc. Can., VIII., iv., 44, 68, 1902.

resemblance and expressed the belief that the two were identical.[1] In 1891 Solms-Laubach reiterated this view, but in a much more cautious manner, directing attention to the near approach to the recent S. sempervirens.[2] More recently Zeiller has given expression to the prevalent view in saying that it is to be regarded as the direct ancestor of S. sempervirens of California, from which it cannot be distinguished by any important characters.[3] Elsewhere it has also been shown that there is good reason for the belief that we now have a knowledge of the wood of this species,[4] a belief which is greatly strengthened by more recent studies of the same type of wood from other localities where it has been found in a more perfect state of preservation, and by the great similarity—it might almost be said by the identity—which it presents to Sequoia sempervirens.

There is, therefore, no real reason why this species should not be accepted at once, as Sequoia sempervirens, and its original name relegated to the position of a synonym.

One feature of very great interest attaching to this plant, is the fact now made apparent, that it at one time flourished within the region of the Great Plains from which it must have been driven by causes similar to, perhaps identical with those which also drove the Douglas fir back to its present position in the mountain region. It certainly flourished in the Great Plains region as late as the Lignite Tertiary, and there is every reason to suppose that it may have been there as late as the Glacial period. At all events, both this tree and Pseudotsuga douglasii should be carefully looked for in any future explorations of the later Tertiary formations.

Sequoia burgessii, n. sp.

Figs. 5-8.

Eocene of the Great Valley and Porcupine Creek Groups.
Bib. :—B. N. A. Bound. Comm., 1875, App. A, 331. Cat. Cret. and Tert. Fl. 30.

Among the woods from the Great Valley studied by Sir William Dawson in 1874, one specimen was designated by the name of Cupressinoxylon species (*a*). This was characterized by the occurrence of the bordered pits in two rows, by the long resin cells and the presence in the medullary rays of resin canals. It is, therefore, possible to identify the present species as the one to which this description was

[1] Pal. Vég., II., 314.
[2] Foss. Bot., 58, 1891.
[3] El. de Pal., 271, 1900.
[4] Cret. & Ter. Plants. Trans. R. Soc. Can., VIII., iv., 44, 68.

applied.[1] The opinion was expressed that the wood might belong to one of the Sequoias represented in the beds by leaves and fruit. A more detailed study of this wood enables us to determine to what extent these references are justified.

Transverse.—The growth rings are rather narrow and distinguished by a narrow but rather dense zone of summer wood, which is rather abruptly defined from the spring wood. The tracheids of the latter are very large, squarish and thin-walled, while in the former the 4—9 rows of cells are thick walled. The entire aspect of the section is such as to immediately call to mind the similar structure of Sequoia sempervirens, while it also recalls the structure of S. langsdorfii from Vancouver and the Queen Charlotte Islands.[2] In the latter, however, a point of difference is to be noted in the conspicuously thicker walls of the tracheids of the spring wood. Resin cells are numerous and to be at once recognized by their uniformly dark color, due to the abundance of the somewhat massive resin they contain. These cells are found abundantly throughout the growth ring, but most numerously on the outer face of the summer wood. Here again we get a point of very strong resemblance to S. sempervirens, but of divergence from S. langsdorfii.

No evidence is presented by the specimens in transverse section to show that resin canals formed a part of the original structure, and in this there is a well defined deviation from the characteristics of both S. sempervirens and S. langsdorfii, in both of which imperfectly organized resin canals appear on the outer face of the summer wood, though not with great or regular frequency. In one or two instances, within the summer wood of a single growth ring, small, rounded spaces were to be seen, strongly suggestive of former resin canals. They were about 116 microns in diameter, or equal to about two or three tracheids. There was absolutely no evidence of structure, however; the edges of the openings showed that structures of the size of canals could not have occupied the spaces, although upon comparison with the resin canals in S. sempervirens, the openings were found to be about equal to the average size of those structures, inclusive of the epithelial cells. Further examination disclosed the fact that similar openings in Cupressus could be referred to local crystallization and consequent obliteration of structure, and when this was joined to the additional fact that the longitudinal sections gave no evidence of resin canals, but exhibited local areas of crystallization which could be correlated with those of the transverse section, the conclusion that resin canals were absent became fully justified.

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[1] B. N. A. Bound. Comm., 1875, App. A, 331.

[2] Trans. R. Soc. Can., VIII., iv., 1902, 44.

The numerous medullary rays are chiefly one cell wide, but occasionally one of greater width is to be seen, and it then shows numerous large thyloses in its central portion.

Radial.—In the radial section the details of structure are not as well defined in consequence of the extent to which alterations had been developed through decay. It was, therefore, not possible to make as clear a specific diagnosis as would have been desirable, in order to establish exact relations with other species, but enough were recognizable to justify certain conclusions. Under a moderately low power the medullary rays may be seen to be composed of elements of one kind only, *i.e.*, parenchyma cells, while the walls appear to be thin and not pitted. Nevertheless, under a higher power it may be seen that decay had operated to such an extent as to obliterate all structural markings. Resin cells are frequent in the wood and at once to be recognized by their abundant, dark coloured and granular, resinous contents. The individual cells are several times longer than broad, and terminated by transverse walls. They present no structural peculiarities which might serve to differentiate this wood from that of other Sequoias.

The tracheids occasionally present sufficiently well preserved structure to permit a recognition of the bordered pits which are chiefly in two rows and large as in S. sempervirens. In this respect it differs from S. langsdorfii where the pits are more generally in one row, and the affinity thus appears to be in the direction of S. gigantea.

One of the most remarkable structural features is exhibited in the presence of numerous thyloses in certain of the medullary rays, due to the development there of resin canals. This feature will be more appropriately discussed in connection with the tangential section.

Tangential.—The resin cells are seen to have the same aspect as in the radial section, being about 2—3 times longer than broad, and as in the latter, a very thorough search has abundantly proved that there are no resin canals penetrating the structure in a longitudinal direction. The relative positions of the transverse and longitudinal sections was such that structures belonging to the one must have been shown in the other if present, and I therefore feel no hesitation in the statement that resin canals traversing the wood longitudinally, do not constitute a structural element of this species. The full significance of this fact does not appear until the longitudinal, and especially the tangential sections are brought under examination. Tangentially the medullary rays are seen to be of two kinds, a fact noted by Sir William Dawson in 1875.[1] In the first case the most numerous rays are of the ordinary, uniseriate type, and present nothing which will serve to disinguish them from the simple rays of other species of Sequoia. In the second case one may notice a number of rays of

[1] B. N. A. Bound. Comm., App. A, 331.

the fusiform type. These are quite as abundant as in any of the Coniferae where they normally occur, and as in other cases, they are characterized by the presence of a central resin canal. In their general aspect they suggest the type common to the genus Pinus, in that the central tract broadens out somewhat abruptly, the cells are all thin walled, and the resin canal of the central tract contains an abundance of thin-walled thyloses. No similar structure is to be found in any of the existing species of Sequoia. The only approach to it is to be found in S. sempervirens, where certain of the medullary rays broaden out into a fusiform shape by the development of cells which become 2-seriate through the central portion, but in none of the numerous specimens of this species examined by me, have I yet found anything approaching the possible structure of a resin canal. The 2-seriate character of the ordinary rays, is also a feature of the wood now under discussion, and this feature makes the resemblance to S. sempervirens much stronger, though it by no means establishes identity.

Under the name of Sequoia magnifica, Dr. F. H. Knowlton has described a fossil species from the Yellowstone National Park [1] which so closely resembles S. sempervirens that Dr. Knowlton says it is "hardly to be separated by any well defined characters," and that there can be "no doubt that the living redwood is the direct descendant of this remarkable tree that was once so abundant in the Yellowstone National Park." [2] S. burgessii resembles this fossil in many essential features, but differs from it in the very essential fact that it has conspicuous resin canals in the medullary rays, which Dr. Knowlton informs me are certainly wanting in S. magnifica. Under these circumstances it is necessary to distinguish the specimen from the Great Valley Group by a separate name, and for this purpose it seems appropriate that the work of my friend, Dr. T. J. W. Burgess, who served as Botanist to the British North American Boundary Commission, and who did valuable work in studying the existing flora of that region, should be recognized. The complete diagnosis of Sequoia burgessii as now known is as follows: —

Transverse.—Growth rings chiefly narrow but variable, the rather narrow but variable summer wood dense, the transition from the spring wood abrupt. Tracheids of the spring wood large, squarish and thin walled. Resin canals wholly wanting. Resin cells numerous throughout the growth ring, but especially on the outer face of the summer wood; with dark, massive resin. Medullary rays chiefly one cell wide, occasionally broader and bearing a resin canal with large thyloses.

Radial.—Bordered pits large, in 1-2 rows. Medullary rays often with a large resin canal bearing thyloses; the cells all of one kind, the upper and

[1] U. S. Geol. Surv., Mon. XXXIII., Part II., 761, pl. CXI.

[2] *Ibid*, 762.

lower walls thin and much altered by decay, the lateral walls devoid of recognizable markings.

Tangential.—Ordinary rays 1 or sometimes 2-seriate in parts; fusiform rays with large resin canal containing thyloses.

Cupressoxylon dawsoni, n. sp.

Figs. 9-11.

Eocene of the Great Valley and Porcupine Creek Groups, N.W.T.

Bib. :—Dawson, B. N. A. Bound. Comm., 1875, App. A, 331. Knowlton, Cat. Cret. and Tert. Floras, 80.

It is difficult to identify the wood under consideration with the material examined by Sir William Dawson in 1875, but in all probability it is embraced in what he then designated as Cedroxylon, a portion of which, at least, represents Thuya interrupta.[1] It may also be represented by the two species designated as (*e*) and (*b*).

The transverse section shows rather broad growth rings with a spring wood composed of large, squarish and thin-walled tracheids which recall the structure of Cupressus macrocarpa or C. thyoides, a resemblance greatly strengthened by the gradual passage of the spring wood into a thin summer wood composed of 2-4 rows of radially flattened tracheids with somewhat thicker walls. The very prominent and resinous rays suggest a further relation to C. macrocarpa, while on the other hand, the very numerous resin cells direct attention to both C. goveniana and C. nutkaensis—particularly to the former.

In radial section the resinous rays are found to be devoid of tracheids, the terminal walls of the cells are straight or curved, while the lateral walls are marked with oval or rounded pits, often several to the tracheid. The radial walls of the wood tracheids are marked by bordered pits which usually lie in one row or sometimes two rows, thus establishing a resemblance to C. macrocarpa where the pits are often in pairs, but more particularly to C. lawsoniana in which the pits are in one or sometimes two rows.

In the tangential aspect the wood is seen to have resinous rays of the uniseriate type, the cells of which are very resinous and transversely oval or oblong. Three modern species present similar characteristics, viz., C. gaudaloupensis, C. goveniana and C. macrocarpa. Among these the resemblance to the latter is very close. From these facts we may conclude that the wood is a specimen of Cupressus, most nearly related to C. macrocarpa among existing species. As identity cannot be fully established through the material at hand, it seems

[1] B. N. A. Bound. Comm., 1875, App. A, 331.

expedient to designate it for the present by a separate name for which C. dawsoni seems appropriate. The diagnosis is as follows:—

Transverse.—Growth rings rather broad. Tracheids of the spring wood large, thin-walled and squarish, the structure passing gradually into the thin summer wood composed of 2—4 rows of radially flattened thicker-walled tracheids. Medullary rays very resinous. Resin cells numerous throughout the growth ring, and chiefly disposed in tangential rows.

Radial.—Medullary rays very resinous, devoid of tracheids; the lateral walls with oval or round pits, several per tracheid; the upper and lower walls entire; the terminal walls entire, straight or curved. Wood tracheids with large bordered pits in one or sometimes two rows.

Tangential.—Medullary rays very resinous, strictly uniseriate; the cells large, thin-walled and transversely oval or oblong.

PSEUDOTSUGA MIOCENA, Penh.

Figs. 12-13.

Miocene of Cariboo, B.C.
Eocene of the Great Valley and Porcupine Creek Groups, N.W.T.

Bib. :—Trans. R. Soc. Can., VIII., iv., 68, 1902; Brit. N. A. Bound. Comm., 1875. 93-97; App. A, 331; Knowlton Cat. Cret. and Tert. Floras, 80, 227.

This species was first recorded from the Cariboo mine at Cariboo, B.C., in 1902,[1] the description being based upon a specimen of poorly preserved wood. So far as I am aware, this formed the first recognition of the genus in a fossil state in America. The plant once more appears in an earlier horizon, this time in the Eocene deposits of the Great Valley Group, N.W.T., near the forty-ninth parallel. There is no previous record of this wood from that locality, and in an examination of this same material in 1875,[2] Sir William Dawson failed to identify it. On examining his descriptions, however, I find a number of coniferous woods which he assigned to the genus Cupressoxylon and distinguished by letters only. He further pointed out that the woods thus provisionally included, might in reality represent several genera. Among these species (*f*) is probably identical with the one now under consideration.

I also find reference to a Taxoxylon which is not specifically described,[3] but said to be distinguished by "spirally lined wood cells of the type of those in the modern Taxus, and discs with a slit instead of a round pore." No taxine wood is to be found in the collection,

[1] Trans. R. Soc. Can., VIII., iv., 68, 1902.
[2] B. N. A. Bound. Comm., 1875, App. A, 331.
[3] B. N. A. Bound. Comm., 1875, App. A, 331.

but it does often happen that Pseudotsuga presents precisely the characters thus described, from which circumstances I feel justified in regarding the Taxoxylon in question as really Pseudotsuga miocena with which it fully agrees.

The specimens described in the first diagnosis[1] were very poorly preserved. The material from the Great Valley Group is in many respects in a much better state of preservation, in consequence of which it becomes possible to recast the diagnosis on the following lines:—

Transverse.—Growth rings broad and prominent; the tracheids of the spring wood large and thin-walled, the structure passing gradually into the thin but rather prominent summer wood composed of about 3—10 rows of thick-walled tracheids. Resin cells not obvious. Resin canals small, not very numerous, chiefly in the summer wood, often double as in P. douglasii; the epithelium cells small and thick walled. Medullary rays slightly resinous. The entire structure of the transverse section bears a strong resemblance to the fine grained wood of P. douglasii.

Radial.—Bordered pits in one row. Cells of the medullary rays straight, the thin upper and lower walls devoid of pits. Pits on the lateral walls of the ray cells about 4 per tracheid.

Tangential.—Ordinary rays uniseriate or 2-seriate in part, the cells oval or round, thick walled, about 24.5 μ broad. Fusiform rays narrow, the cells thick-walled, the resin canal narrow.

Rhamnacinium porcupinianum, n. sp.

Figs, 14, 15, 16, 21, 22.

Eocene of the Porcupine Creek and Great Valley Groups.

Bib. :—Knowlton, Cat. Cret. & Tert. Flor., 199; Felix, Untersuchung uber fossile Holzer; Zeitscher, d. Deutsch. geol. Gesell., 1896, 252, pl. VI., fig. 3; B. N. A. Bound. Comm., 1875, App. A, 330; U. S. Geol. Surv., Mon. XXXII, Part II., 769, pl. CXVIII and CXIX; Trans. R. Soc. Can., IV., iv., 27, etc.

In his original examination of woods from the Great Valley Group, Sir William Dawson recognized only one Angiospermous type. This he regarded as referable to the genus Populus which is also largely represented in the same beds by fossil leaves.[2] The specimen now under consideration is identical with the Populus thus referred to, but it requires further determination of its specific characters. The determination as originally made was no doubt suggested by the very striking resemblance which the structure of the transverse section bears to the poplars, and especially to P. balsamifera, but a more

[1] Trans. R. Soc. Can., VIII., iv., 68, 1902.

[2] B. N. A. Bound. Comm., 1875, App. A, 331.

critical compaarison with this last species, especially from the standpoint of the longitudinal sections, shows a want of agreement in some very important respects. The accompanying list of dimensions may be introduced here to show in part, the resemblance to Populus balsamifera. While such data have no absolute value for diagnostic purposes, they are nevertheless useful as supplementing other data, and will be referred to later.

COMPARISON OF CELLS AND CELL WALLS.

	Size of Cells. Spring wood.	Thickness of walls. Spring wood.
Rhamnacinium porcupinianum..	20.0 μ	9.37 μ
Populus balsamifera..	21.3 μ	9.37 μ
Populus fremonti	22.5 μ	6.25 μ
Salix longifolia..	13.7 μ	6.25 μ
Salix bigelovii...	14.5 μ	6.25 μ
Rhamnus caroliniana..	15.3 μ	4.7 μ
Rhamnus purshiana..	14.2 μ	3.1 μ

In 1896 Felix described a wood from the Yellowstone National Park to which he applied the name of Rhamnacinium radiatum.[1] As figured and described, this wood bears a remarkable resemblance to our specimen which is again comparable with another wood from the Yellowstone National Park described by Knowlton in 1899,[2] and referred by him to Rhamnacinium radiatum, though regarded as such with some hesitation, on account of its striking resemblance to a poplar. It would thus appear that there is considerable doubt attached to the identity of this fossil, which it is important to remove; and the difficulty is greatly increased by the very striking resemblance which is to be found between the structural details of the wood of the Rhamnaceæ and the Salicaceæ. It, therefore, becomes necessary to determine

1st. If our specimen belongs to the Rhamnaceæ or the Salicaceæ.
2nd. If to the latter, whether it is a Salix or a Poplar.
3rd. If to the former, whether it is identical with the Rhamnacinium of Felix, or with the somewhat doubtful one of Knowlton, or with both.

To the solution of these questions I shall endeavour to bring evidence derived from existing species of both families, in the hope that it may furnish a final answer.

The state of preservation of the specimen is such that considerable difficulty has been experienced in obtaining a diagnosis which I could

[1] Zeitschr. d. Deutsch. geol. Gesell., 1896, 252.
[2] Flora of the Yellowstone Nat. Park, 769.

feel certain satisfied every requirement. For the most part all traces of organic matter have disappeared, and it is only here and there that regional areas still retain enough carbonaceous matter to make the parts stand out with prominence. Elsewhere, the structure is represented entirely by a transparent, siliceous cast which makes it exceedingly difficult to bring out the details. In addition to this, most of the details of the cell wall have been obliterated by decay, while the structure of the vessels has been largly replaced by crystals of silica. By first carefully studying the details of structure in Populus, Salix and Rhamnus, it was possible to determine what elements should be looked for, and in this way it has been possible to obtain a diagnosis which, while it is deficient in one or two respects, is nevertheless so complete as to enable us to answer the questions at issue with a fair degree of accuracy. This diagnosis is as follows:—

Transverse.—Growth rings rather broad, the thin and inconspicuous summer wood of 2—4 flattened cells. Medullary rays distant 4—8 cells, 1—4 cells wide. The wood cells rather thick walled, small, in radial rows. Vessels numerous throughout the growth ring, becoming abruptly smaller in the region of the summer wood; radially oval or oblong, in radial series of 1—7, sometimes in tangential series and then forming irregular groups; in one row, sometimes two rows, between each pair of rays.

Radial.—Medullary ray high, the cells of two kinds; the low, central cells about 3—4 times longer than high, numerous and about one-half the height of the high, less numerous and chiefly terminal, short cells, which are about as long as high or sometimes longer; the lateral walls multiporose when opposite a vessel. Vessels with multiseriate, hexagonal pits with transverse, slit-like pores. Scalariform vessels not determinable. Wood parenchyma cells thick-walled, three times longer than broad.

Tangential.—Medullary rays of two kinds; the uniseriate rays upwards of twelve cells high, the cells large, oblong, all of one kind; the multiseriate rays from 2—4 cells wide, lenticular and composed of two kinds of cells, the smaller numerous and composing the principal structure, the larger and less numerous terminal and single, often extended into a single series or interposed between areas of the smaller cells. Vessels as in the radial section.

It is now in order to secure an answer to the first question, as to whether this wood belongs to the Rhamnaceæ or the Salicaceæ, and the answer will, to some extent, involve also, the second question as to whether it is a poplar or a willow. These two families present many features in common. In the Rhamnaceæ the wood cells lie in radial rows, they are chiefly small, rather thin walled and the structure as a whole, is somewhat open and soft. In the Salicaceæ the wood cells also lie in radial rows, they are rather large and the walls are

somewhat thick, especially so in two cases shown by an examination of seven species of poplars and nine species of willows, though it is to be noted that as between these two genera, the walls are much thicker, and the structure as a whole is more dense in Salix than in Populus. In the table already presented, comparison has been made with those two species of poplar and willow which most nearly resemble the fossil, while two indigenous species of Rhamnus are also brought into comparison. From this it will become apparent that so far as these cases go, the structure of Rhamnus is composed of much smaller and thinner-walled cells than in the Salicaceæ, and that the fossil distinctly approaches P. balsamifera. But we cannot draw final conclusions from such data, since the willows and the poplars show that very considerable variations in the size of the wood cells obtain as between one species and another, and we have no evidence in support of the idea that an Eocene or Miocene Rhamnus may not similarly have had relatively large cells.

In both Rhamnaceæ and the Salicaceæ, the growth rings show a very poorly defined summer wood which consists of 2-4 radially flattened cells with somewhat thicker walls. In Rhamnus caroliniana even this distinction is almost obliterated, but it persists in the Salicaceæ as a whole, with considerable constancy. Both families possess a strong point of resemblance in the numerous vessels which, in transverse section, become abruptly smaller in the region of the summer wood, are disposed in radial series, and also form groups in which the cells fall into radial series of 1-7 or sometimes more. In the Salicaceæ such radial extension is almost exclusively developed, but in the Rhamnaceæ there is also a tangential extension of a more irregular character whereby the series often broadens out into an irregular group. This constitutes a somewhat definite differential character, though one of minor importance. In the radial and tangential sections the vessels are of two kinds in Rhamnus, but only of one kind in the Salicaceæ, and this feature is one which acquires definite importance for differential purposes. Many of the vessels in Rhamnus and all the vessels in the Salicaceæ show multiseriate, hexagonal pits which are rarely oval, the pore of which is a transverse, narrow slit. In addition to these the Rhamnaceæ also exhibit numerous and prominent scalariform vessels with narrow and somewhat distant bars, a feature which is entirely wanting in the Salicaceæ.

Longitudinal sections of the wood of Rhamnus show somewhat prominent wood parenchyma in the region of the vessels. These elements are thin-walled and several times longer than broad in R. caroliniana, but rather thick-walled and 2-3 times longer than broad in

R. purshiana. In the Salicaceæ the cells are narrow and many times longer than broad.

In transverse section the medullary rays of the Salicaceæ are chiefly one cell wide, while in the Rhamnaceæ they are from 1-3 cells wide. In the tangential section, where some of the most characteristic features are to be found, a careful examination of seven species of poplars and nine species of willows shows that the rays are almost all of one kind and uniseriate. Partial exceptions occur among the poplars in P. fremonti in which the rays become 2-seriate in part; and among the willows in S. longifolia and S. bigelovii where the rays are more commonly 2-seriate through the central portion. There are two kinds of cells, however, distinguishable by their difference in size and situation, being primarily terminal or again sometimes interspersed. This twofold form of the cell is a striking feature of the Rhamnaceæ in which the larger cells are chiefly terminal, but in R. purshiana they occasionally lie in the central portion of the ray which then becomes contracted to one cell in width.

In the radial section the rays of Rhamnus show two kinds of cells so distributed that the low, relatively long and more numerous cells lie in the centre, while the high, very short cells occupy the margins. In R. caroliniana the walls of all the cells are thin and devoid of pits, and the same is also true to a large extent of R. purshiana, which nevertheless not infrequently shows the entire ray to be composed of thick-walled cells, the walls of which bear numerous fine pits, and through these features there is developed a very striking similarity to the fossil. In the Salicaceæ two kinds of cells are also present, and in their relative dimensions and positions, they somewhat closely resemble those of the Rhamnaceæ, though in some respects they more nearly resemble those of the fossil. So much variation is possible in details of this character that one must not place too much reliance upon them, although they might serve to influence a final decision. Where the cells of the medullary ray lie opposite a vessel, they are always perforated with rounded pores disposed in two or more series, and this character, which is common to the Salicaceæ, Rhamnaceæ and the fossil, offers no opportunity for differentiation.

A careful comparison of the foregoing facts with the diagnosis of the fossil, will show that the latter resembles the structure of Rhamnus in the following particulars:—

1st. The aggregation of the vessels in transverse section.
2nd. The presence of (both scalariform? and) pitted vessels.
3rd. The presence of wood parenchyma.
4th. The multiseriate character of the medullary rays in transverse section.
5th. The uniseriate and multiseriate rays of the tangential section.

6th. The presence of two kinds of cells in tangential section, and their relative positions.

7th. The two kinds of cells shown in radial section, their disposition and relative dimensions.

By the first five of these characters the genus is also separated from the Salicaceæ, while it also seems probable that the distribution of the two kinds of cells in tangential section, is more nearly like that of the Rhamnaceæ than of the Salicaceæ. From these considerations it is evident that our fossil must be held to be a Rhamnacinium rather than either a Populus or a Salix. It is true that three species of poplar (P. genetrix, P. richardsoni, and P. arctica) have been found somewhat abundantly both at Porcupine Creek and in the Great Valley,[1] while the same localities also show leaves of Salix raeana;[2] but on the other hand, the leaves of Rhamnus concinnus and another undesignated species, are well known forms in the deposits at Porcupine Creek and Great Valley,[3] so that evidence from this source does not lend material support to one or the other possibility. It now remains to determine in what respects our fossil is related to the specimens of Felix and Knowlton.

While our specimen and that of Felix are undoubtedly related generically, they differ in such respects as to justify the belief that they may represent different species. In the R. radiatum of Felix, he describes the numerous medullary rays as having only one row of vessels between each pair. In our specimen, on the contrary, each pairs of rays embraces one or frequently two rows of vessels. The most marked dissimilarity is to be found in the proportions of the two kinds of cells in the medullary rays. In R. radiatum the large cells are terminal and do not appear to extend into a single series which forms so prominent a feature of our specimen. It is possible that this character does not possess very great importance, but I am hardly inclined to accept this view in consideration of the difference in this respect which obtains between Rhamnus caroliniana and R. purshiana, and I should therefore be disposed to consider the material from Porcupine Creek as representing a distinct species for which I would suggest the name of R. porcupinianum. Among existing species of North American Rhamnaceæ, the nearest approach seems to be to R. caroliniana, both with respect to the general character of the transverse section and the structure of the medullary rays. The Rhamnacinium of Knowlton cannot be compared so accurately, as his description does not include some of the essential data, but from a careful comparison

[1] Trans. R. Soc. Can., IV., iv., 27; B. N. A. Bound. Comm., 1875, App. A, 330.

[2] B. N. A. Bound. Comm., 1875, App. A. 330.

[3] *Ibid.*

of his figures and descriptions with those of Felix, I have little hesitation in regarding the two as belonging to the same species.

Rhamnacinium triseriatim, n. sp.

Figs. 17-20.

Eocene of the Porcupine Creek and Great Valley Groups.

Bib. :—B. N. A. Bound. Comm., 1875, App. A, 331.

The wood originally referred to by Sir William Dawson as that of a poplar, really comprises two species which are to be referred without question, to the genus Rhamnacinium. The first of these has already been described, and the second, which differs from it in essential features, may now be diagnosed as follows:—

Transverse.—Growth rings rather narrow. Summer wood not conspicuous, narrow and composed of 2—4 radially flattened and somewhat thicker walled cells. Wood cells in radial rows, rather thick walled. Medullary rays numerous, from one to three cells wide. Vessels numerous in radial rows; not large; radially elongated elliptical or oval, when double in radial or tangential series; gradually diminishing in size and number toward the summer wood where they are small or entirely wanting.

Radial.—Rays numerous, the cells of two kinds with their lateral walls multiporose when opposite a vessel; the short and higher marginal cells thick walled and pitted, variable, rarely twice longer than high, usually of the same length, often interspersed; the narrower central cells about four times longer than high, thick walled. Scarlariform vessels numerous and conspicuous. Pitted vessels not determinable. Wood parenchyma not determinable.

Tangential.—Ray cells of two kinds; the uniseriate rays chiefly small and few; the multiseriate rays narrow and high, the cells of two kinds; the small and thick-walled cells chiefly 3, or sometimes 4-seriate, the large, thinner walled cells oval or oblong, terminal and uniseriate, often interposed between regions of smaller cells. Vessels as in the radial section.

Among existing species of Rhamnus which it has been possible to bring into comparison, the resemblance is in many respects closest to R. purshiana, from which, however, it differs in the general aspect of the transverse section, and in the detailed structure of the medullary ray. The radial aspect of the medullary ray is very similar to what may be seen in Salix longifolia with respect to the relative distribution of long and short cells. The great excess of the multiseriate over uniseriate rays, is also another feature which establishes similarity with Rhamnus purshiana, and this resemblance is further emphasized by the generally triseriate character of the larger rays. It only remains

to point out that the chiefly 3-seriate form of the larger rays as seen in the tangential section, has been selected as the basis of specific differentiation.

Biological Considerations.

The present studies have served to give emphasis to the fact that in the Coniferæ, certain species show more or less well defined deviations from the structural characteristics which may be regarded as constituting normal specific or generic features. It was shown some years since that in those coniferous woods which have resin passages traversing the stem longitudinally, there are also similar resin passages extending radially through certain of the medullary rays which thereby become specially altered,[1] and the law of association thus indicated, has been found to be so constant for the North America Coniferæ, that where one of these structures is found the other may be inferred. Nevertheless, it was pointed out at that time that certain well defined exceptions to this law are to be recognized in species of Abies and Sequoia, where imperfectly organized resin passages traverse the wood longitudinally, but without a trace of corresponding canals in the medullary rays. At that time the possible significance of these facts did not appear, and they were looked upon as of a sporadic nature and therefore of little significance, but the more recent discovery that they have persisted in some cases since Cretaceous time, has invested them with a new interest and makes it important that their relation to the general course of development should be ascertained.

Although the material at hand is not very extensive, it nevertheless seems desirable to examine the data it presents with a view to determining the bearing of the facts upon the evolution of the species, and at least to establish a basis which may serve as the starting point for further treatment as additional material may appear in the future.

In order to gain a clear conception of the nature of the facts in question, and their full significance from the standpoint of development, it will be necessary to briefly review certain structural characters of the Coniferæ and establish their bearing upon the relations of the various species and genera, and for our present purpose it will be useful to consider the Taxaceæ and Coniferæ as a whole. While the present discussion relates exclusively to the anatomical characters developed within the xylem region, and therefore takes no cognizance of those characters of foliage and inflorescence upon which relations are more commonly established, it will nevertheless come within the scope of our present purpose to eventually compare the relations deter-

[1] Trans. R. Soc. Can., II., iv., 39.

mined in the two ways and see how far the results may be reconciled with one another.

The anatomical details of the vascular cylinder which may be held to possess value for diagnostic purposes, stated in the supposed order of development, are as follows:—

1. Spiral tracheids.
2. Uniseriate rays.
3. Resin cells.
4. Ray tracheids.
5. Resin passages.
6. Fusiform rays.
7. Thyloses in the resin canals.
8. Cells of the medullary rays of two kinds.

Of subordinate diagnostic value.

9. Resin cells in bands.
10. Resin cells scattering throughout the growth ring.
11. Resin cells few and scattering on the outer face of the summer wood.

Spiral Tracheids.—The spiral bands developed on the inner face of the tracheid wall may be held as primarily designed to afford a greater measure of mechanical support to the structure in which they occur. In the progressive alteration of the wall, such thickenings tend to disappear, being absorbed in the more general thickening of the secondary growth, which becomes a prominent feature in the tracheids of the Gymnosperms and the great majority of the Angiosperms. Their obliteration as distinctive markings is, therefore, in direct relation to the higher organization of plants, and as elsewhere shown, their occurrence always serves to establish a definite connection with the lower Gymnosperms or even with more primitive forms among the Cycadofilices.[1] Their permanent survival in the Taxaceæ, therefore, not only serves to give this group a well defined connection with more primitive types, but it also serves to separate it definitely from the Coniferæ in which, as a whole, such structures are wanting or at least rare, and to which it is inferior in position.

So far as the North American Coniferæ can supply evidence — and the same will hold true also of the exotic Cedrus, Agathis and Araucaria — progressive development has resulted in the final obliteration of the spirals and their replacement by bordered pits which arise in natural succession.[2] It is, however, true that the tendency toward the development of spirals persists in the most highly developed types of the Coniferæ. This is expressed in the perfect formation of spirals

[1] Trans. R. Soc. Can., II., iv., 39; *Ibid*, VI., iv., 57.

[2] *Ibid.*, II., iv., 39; VI., iv., 57; M. Mic. Jnl., 1869, 67-70.

in some species for which they constitute distinctive features, or their imperfect development and sporadic occurrence in others. In Pseudotsuga this tendency finds its most complete expression, and the genus may be differentiated from all those to which it is otherwise related, by the constancy with which the spirals are developed, and the perfection of their formation. As to the precise phylogenetic significance of this fact, we are not in a position with respect to present data, to draw final conclusions, but two explanations offer possible lines along which solution may be reached. In the one case the spirals may be regarded as atavistic. While this hypothesis could be supported without difficulty from the standpoint of analogy, it does not seem to be wholly justified by the extent of development and the constancy and completeness with which the spirals occur. On the other hand, they may be viewed as vestigial structures representing features which have been left over in the gradual development of the genus, and isolated by obliteration of intermediate types which originally connected Pseudotsuga with the Taxaceæ or their prototypes.

In Larix americana the outer tracheids of the summer wood sometimes develop very distinct spirals, and the same is also true of some of the hard pines, notably Pinus tæda — but in none of these cases do the spirals become so constant in occurrence or so perfectly developed as to constitute a reliable differential character. They are clearly sporadic. Here, then, we find the tendency toward the recurrence of primitive characters expressed in the most highly developed Coniferæ where they would seem to be expressions of the law of atavism rather than of the nature of vestigial structures.

Uniseriate Rays.— Uniseriate rays are a structural feature common to all the Taxaceæ and Coniferæ without exception, and their occurrence offers no evidence of special phylogenetic value. In most cases the uniseriate form is maintained without variation, while in some cases, as in Sequoia and Cupressus, there may be a more or less pronounced tendency toward the formation of a more complex structure as expressed in the fact that they become 2-seriate in part, in which case the central portion broadens out while the extremities retain their uniseriate character. This tendency is not expressed with any degree of constancy, and it may appear in certain species of a genus, the others of which show no tendency. It is, therefore, not possible to employ it as a differential character having phylogenetic value, with any degree of success. It nevertheless may be held to possess a certain element of value as the first expression of a tendency toward the formation of those more highly organized rays of the fusiform type which are distinguished by the presence of resin passages.

In relation to the spiral tracheids, the uniseriate rays are unquestionably secondary in development, as their reduction from the multiseriate form common to the lower Gymnosperms, and so conspicuously developed in the Cycads, has followed the reduction of spirals to bordered pits, and they are, therefore, to be held in general, as evidence of a higher type of development.

Resin Cells.— The non-resinous wood of the Taxaceæ constitutes a well defined means of separating this family from the Coniferæ in which the resin is a prominent feature. In this latter family, the resin is always derived from specialized structures of a more or less complicated nature. These are resin cells and resin passages, and the two may be discussed separately.

The resin cells in transverse section are to be distinguished by the presence of resinous contents, or by the colour which they naturally possess; and where the plane of section passes sufficiently near to the terminal wall, the latter is seen to have the general aspect of a sieve plate. It is upon this latter feature that one is sometimes obliged to rely exclusively, as in Abies, Larix and Tsuga, although certain features of form and relation to adjacent elements, may assist in the final determination. The resin cells are variously distributed in different genera, being rarely grouped, and these differences may be utilized as differential characters though of subordinate value, inasmuch as there is no sharply defined variation, but one form may readily occur in another genus to which it does not strictly belong.

In longitudinal section the resin cells are seen to be long-cylindrical with square terminations (Figs. 24, 25 and 29). The length is very variable in different species and so far, there seems to be no specific relation between length and either genus or species, a view which is strengthened by the observation that even in the same species, notable variations occur according to situation, as to whether in the spring or the summer wood (Figs. 24*b*, *c* and 25*a*, *b*). Thus, in Sequoia gigantea (Fig. 25*a*, *b*) the cells from the spring wood which contain an abundance of resin, are less than two-thirds the length of those from the summer wood which contain little or no resin. Also in S. sempervirens, a similar difference occurs, only that the cells from the spring wood are less than half those from the summer wood. And so for all other genera. The cells commonly bear simple pits on the radial walls, but in Sequoia sempervirens these sometimes show transitions into bordered pits (Fig. 24*c*), and it commonly happens that in the summer wood the cells lie immediately internal to tracheids with square ends and bordered pits (Fig. 24*c*), or they may even fall within the same series as in Abies amabilis (Fig. 29*a*, *b*), where *a* is coterminous with *b* at its upper end. In these genera, which normally have no

resin passages, there is sometimes a more or less marked tendency for the resin cells to become massed in evident preparation for the development of more complicated structure. This is true of Sequoia gigantea, and it may also be found in Juniperus communis, Libocedrus decurrens and Cupressus gaudaloupensis. Where such aggregations occur, the tendency is always for the individual cells to become shortened up and approach an isodiametric form precisely as in the epithelium cells of the resin passages of Sequoia sempervirens (Fig. 24 on the left), or of Abies amabilis (Fig. 27). From this it is clear that the parenchymatous resin cells of the wood may undergo transformation in two directions, passing into tracheids with bordered pits on the one hand, or, on the other hand, becoming shorter and shorter according to situation and aggregation until they pass into short cells capable of entering into the composition of a resin passage. The logical conclusion to be derived from this evidence is, that the resin passage is the final expression of peculiar aggregation of resin cells, and from this point of view it represents the higher form of development. In this connection it only remains to point out that the terminal walls of the resin cells are commonly perforated like a sieve plate, although this feature is not always clearly defined in longitudinal section. When the cells are reduced to isodiametric forms, the pits become more prominent and irregular, and may apply to all the walls (Fig. 24).

The resin cells are characteristic features of 66.6 per cent of the genera of North American Coniferæ, in which no other provision is made for the secretion of resin, or at least a very occasional and imperfect one. This group would include all of the Cupressineæ, the Taxodiinæ, and the Abietineæ as represented by Tsuga and Abies. In 16.6 per cent of the genera, the resin cells are accompanied by more specialized resin passages. This group would include Pseudotsuga and Larix, and, as exceptions to the general course of development, certain species of Sequoia and Abies. Finally, 16.6 per cent of the genera are wholly devoid of resin cells as represented by Picea and Pinus, where their places are taken by resin passages. An examination of this distribution will at once make clear the fact that the resin cells are characteristic of the more primitive types, and that they, therefore, represent the more simple and primitive form of the secretory organ—a fact which will receive confirmation from other points of view.

It has been noted that the resin cells present different forms of distribution in the transverse section, and it is of importance to ascertain what relation, if any, this bears to the final development of resin passages and so to the relations of the various genera.

In the genus Juniperus, as represented by six species, the prominent and often numerous resin cells are disposed in well defined bands

which are concentric with other parts of the structure. The same fact appears prominently in Taxodium distichum with respect to the summer wood, but in the spring wood there is a strong tendency to wider dispersion. The same facts also apply to Libocedrus, but the tendency to dispersion is more marked than in Taxodium, whence it approches the latter on the one hand and Cupressus on the other. In Cupressus, C. nootkatensis and C. gaudaloupensis approach Taxodium and Libocedrus in the tendency to the formation of bands, but in C. nootkatensis the principal tendency is toward wide dispersion which is fully expressed in five other species. In Sequoia, the cells are widely dispersed, rarely becoming concentrated into a definite band. Thuya is characterized by the widely dispersed cells, and in this genus the segregation may be said to attain its most complete expression. These relations are such that they will be found to represent developmental phases in such a manner that segregation is a feature of the more advanced types, while aggregation belongs to the more primitive types. This view is based upon the general fact that with an advance toward the higher forms in which resin passages are developed, the latter replace the resin cells which become fewer and more scattering as there is an advance toward, or an actual development of the resin canals. This statement will again come under consideration shortly, but it should be noted at this point that the views thus set forth seem to involve some important exceptions, the nature of which is not quite clear, and further inquiry in this direction is needed. Thus, if we accept the sequence of genera adopted by Eichler,[1] that which is presented here upon the basis of purely anatomical data would require some modification; while yet again, both Agathis and Araucaria, which contain no resin passages, do contain the representatives of resin cells, and these structures exhibit the same general distribution as in Cupressus, often becoming massed in small groups as seen in transverse section. But there is some reason for the belief that further investigation will permit of an explanation of these exceptions whereby they may be harmonized with the theory of succession set forth.

In Tsuga, Pseudotsuga and Abies, as also in Larix, the change in the direction of extreme segregation has progressed so far that the resin cells are reduced to relatively or even absolutely small numbers wholly localized on the outer face of the summer wood. The culmination of this phase of distribution appears to be reached in Abies, in which it is often difficult to recognize the few cells which remain. It may be shown on other grounds, as well as from a more general morphological standpoint, that these four genera represent a distinctly

[1] Engler & Prantl, II., 65 et seq.

higher type of development than those of the preceding groups, whence we may infer that the number and distribution of the resin cells stand in direct relation to sequence in development — not necessarily of the plant as a whole, but of particular structural features — leading eventually to their replacement by more highly organized resin canals. This view gains force from the additional fact that while in Tsuga there are no specialized resin passages, these structures appear sporadically and of an elementary structural form in Abies, but become more fully organized in Pseudotsuga and Larix. Finally, in Picea and Pinus where the resin passages attain their most perfect organization, it is at the expense of the resin cells which are there completely wanting.

Resin Passages.— Resin passages occur in the wood of Pseudotsuga, Larix, Picea and Pinus, or in 33.3 per cent of the North American genera. In the first two the resin passages are associated with resin cells, but no such association occurs in either Picea or Pinus where there is a complete replacement. But it has elsewhere been shown that resin passages do occur sporadically in Sequoia and Abies, though without the corresponding association with radial passages in the medullary rays.[1] In more recent studies of Cretaceous plants, it has transpired that the same character is also found to be a common feature of Sequoia langsdorfii, whereby it becomes even more possible to regard this well known species as the predecessor of, and undoubtedly identical with the existing S. sempervirens.[2] In the latter the resin passages are characteristically found to be disposed on the outer face of the summer wood (Fig. 23)—thus falling within the first formation of spring wood of occasional growth rings. They almost always form a continuous row, the individual passages being much crowded together. They vary greatly in size and, while some are fairly perfect, others are so imperfectly organized as to appear as nothing more than a collection of resin cells, which they are in reality. The entire aspect is such as to at once convey the suggestion that there has been imperfect development of some sort. This impression is confirmed by a study of the longitudinal sections in which the passages are found not to be continuous canals as in Picea or Pinus, but structures which present varying aspects. At more or less frequent intervals the structure opens out so as to develop a well defined central canal, but above and below these regions the surrounding epithelium cells so encroach upon the passage as to completely close it, and in this we gain an explanation of the varying dimensions and structural aspects presented by any given transverse section. The cells of the epithelium are

[1] Trans. R. Soc. Can., II., iv., 45.

[2] *Ibid.*, VIII., iv., 44.

short-cylindrical and very often have pitted walls (Fig. 24*a*). They commonly contain resin and become more elongated the further they are removed from the canal, until they finally pass into much elongated wood parenchyma cells, the terminal walls of which bear bordered pits.

The genus Abies naturally belongs to that group of conifers distinguished by the absence of resin passages and fusiform rays. This is conspicuously true of A. balsamea, A. fraseri, A. lasiocarpa, A. magnifica, A. amabilis, A. concolor, and A. grandis, but in A. nobilis and A. bracteata we meet with important exceptions to this rule, in that they show resin passages in the transverse section. In A. nobilis (Fig. 28), these structures lie chiefly in the central region of the summer wood where they form a continuous row. In A. bracteata (Fig. 26), they more commonly lie on the outer face of the summer wood as in Sequoia sempervirens and in both species the structural similarity to Sequoia is very marked. A longitudinal section through a resin passage shows again that the general relations between the epithelium cells and those of the wood parenchyma are the same as in Sequoia, but a notable difference between the two genera appears in the fact that the passages of Abies are, on the whole, more perfectly organized (Fig. 27). The relations between resin cells and the accompanying wood parenchyma with bordered pits is further emphasized in Abies amabilis (Fig. 29*a*, *b*), where resin cells with simple pits are found to lie in series coterminous with the wood parenchyma having bordered pits. Abies also affords somewhat conclusive evidence as to the relations between resin cells and resin passages. In all the first named species where no resin passages occur, resin cells are well defined; but in A. bracteata and A. nobilis, they are found with considerable difficulty, seeming to suggest that they have been replaced by the former. This replacement becomes more clearly understood in the light of the facts already presented, which go to show that the resin passage is, after all, only a final expression of certain conditions of aggregation in the resin cells, whereby the formation of resin becomes more centralized.

Our studies of the resin passages go to show that while Sequoia gigantea, Juniperus communis, Libocedrus decurrens and Cupressus gaudaloupensis manifest a definite tendency toward the formation of resin passages, these structures are never fully organized. In Sequoia sempervirens, on the other hand, such resin passages are imperfectly developed, though they are never associated with radial canals such as occur in Picea or Larix. As this species is now known to extend far back into Cretaceous time, it is evident that this character is one which has survived for a great length of time, and may therefore be regarded as truly fixed and characteristic of the species.

Ray Tracheids.—In Libocedrus, Sequoia, Taxodium and Thuya the medullary ray consists entirely of parenchyma cells, but in all the other genera there are in addition, what De Bary has distinguished as tracheids, structures which he characterizes as cells which resemble the parenchyma cells of the ray in form and position, and the walls of which, where they border upon equivalent elements or on the tracheids of the bundle, have bordered pits of smaller size than those of the latter, and they further have irregular thickening ridges projecting inward like teeth, on their upper and lower walls.[1] This last feature is exclusively characteristic of the genus Pinus, and it is confined there to the section embracing the hard pines. In Juniperus such tracheids occur very rarely, being found, so far as I am aware, among the six North American species, only in J. communis var alpina in which they are very sparingly developed. In Cupressus, out of six species, they are to be met with only in C. thyoides and C. nootkatensis. In the genus Abies they are confined entirely to A. balsamea among the North American species, and to A. excelsa among European representatives, as pointed out by De Bary many years since.[2] Juniperus, and more especially Cupressus and Abies, thus form a group which stands between Libocedrus, Sequoia, Taxodium and Thuya on the one hand, and all the remaining genera on the other, with respect to their tendency toward the development of ray tracheids.

In Tsuga, Pseudotsuga, Larix, Picea and Pinus, the tracheids form a constant and characteristic feature of the ray structure, and they attain their highest development in the hard pines where they are further distinguished by the development of teeth-like projections from the upper and lower walls. It thus appears that 33.3 per cent of the N. A. Coniferæ (genera) are wholly devoid of ray tracheids; 25 per cent show them sparingly and sporadically, and 4.7 per cent are invariably characteristic of their presence.

Fusiform Rays.—In addition to the simple, uniseriate rays which characterize Cupressus, Sequoia, etc., certain genera also exhibit a more complicated form of the ray which, from its general outline as represented in tangential section, has been designated as the "fusiform ray."[3] This form is determined by the fact that the central tract is occupied by a resin passage which traverses the ray throughout its entire length, and is indistinguishable in point of structure, from the passages traversing the wood longitudinally. As a necessary result of the presence of the resin passage, the central region of the ray also becomes more or less multiseriate. In Pseudotsuga and Larix

[1] Comp. Anat., 490-491.

[2] *Ibid.*

[3] Trans. R. Soc. Can., II., iv., 39.

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the terminals of the ray are strictly uniseriate, and they broaden out abruptly in the immediate neighbourhood of the resin passage, a fact which also holds true for Picea. In all these genera also, the elements, including the epithelium cells, are all thick-walled, and the central canal is small. In Pinus, on the other hand, the central canal is large and commonly filled with thyloses; the epithelium cells are thin-walled and large, while the neighbouring cells of the wood parenchyma are also large and thin-walled; the rays are generally much broader than in the preceding genera, and, as a whole, the structure shows a stronger tendency to broaden out from the terminals, a fact which often finds expression in rays of strictly lenticular form. The characteristics noted are so well defined as to permit a very exact differentiation between Pinus on the one hand and the other three genera, and on this basis it is quite safe to refer nearly, if not quite all species of Pityoxylon to the genus Pinus. From these considerations it is evident that 25 per cent of the North American genera possess fusiform rays as permanent and well defined characters, while 75 per cent are devoid of them.

So far as I am aware, there is no existing species of Sequoia which shows even a remote tendency to the formation of fusiform rays, but in S. burgessii from the Lignite Tertiary of Porcupine Creek and Great Valley, one of the most prominent structural features is the occurrence of very well defined fusiform rays, the central canal of which is filled with thyloses (Fig. 8). The unusually large size of the resin passage at once serves to recall the large, structurally similar and similarly situated mucilage canals of Cycas revoluta. As already noted, no suggestion of such structures is to be met with among the North American Coniferæ, but in Araucaria glauca I have found rare examples of a similar development, though in all cases so far observed, the resin passage has been but imperfectly organized. That this character is wholly exceptional in the genus Sequoia as a whole, cannot be doubted, and it is unknown more recently than the Eocene. How far back in geological time it may have been developed, it is at present impossible to say, but it gives conclusive proof that in Sequoia burgessii we have the culmination of a short side line of development probably within early Tertiary time.

Thyloses in the Resin Passages.—According to generally accepted views, the appearance of thyloses indicates a local, pathological condition [1] since they usually arise as stated by De Bary,[2] in old or dam-

[1] Agricult. Ledger, Calcutta, 1901, No. 8, 129, 180; Jn'l. Bot., X., 1872, 321-323; Ward. Timber and some of its Diseases, 1889, 75; Hartig. Lehrb. d. Baumkrankheit, 1882, 133.

[2] Comp. Anat., 170.

aged, large, tubular tracheæ whereby the internal cavity is partially or completely filled with parenchymatous cells which, when their course of development is once established, may continue their growth after the manner of a tissue. They are familiar structures in the Monocotyledons and in the Dicotyledons, especially in those having long-lived, woody stems; and I have also found them in the vessels of Pteris aquilina where they offer a striking exception to the general law of distribution. Their occurrence in plants is, on the whole, of such a nature that their development is associated with a higher type of development in the organism as a whole, and the principle thus indicated may be applied with propriety to smaller groups. In the Coniferæ the thyloses make their appearance in the resin passages of certain genera where they follow the same course of development as already noted for vessels, and inasmuch as their appearance is related in the first instance to the age of the structure, they may likewise be interpreted as factors indicative of relative degrees of development whenever they become constant.

In Picea thyloses are developed definitely in P. nigra, P. alba, P. pungens and P. sitchensis. In Pseudotsuga they are developed but sparingly, while in Larix they are apparently wanting. These variations appear to be related to the thickness of the walls in the epithelium cells in such a way that the thinner the walls the more generally are thyloses developed. The pines normally show thyloses in the resin passages, a feature which is so constant and so generally absent from the other genera as to constitute a differential feature of some value.

Sequoia burgessii from the Lignite Tertiary presents a remarkable example of the development of thyloses in the resin canals of medullary rays (Fig. 7), and their occurrence in this species becomes of special interest from a biological point of view.

Ray Cells of Two Kinds.—The only other structural feature which calls for comment in this connection, is the occurrence of two kinds of parenchyma cells in the medullary ray. This relates entirely to the genus Pinus where it is again confined chiefly to the section of hard pines. The distinctive difference relates to relative thicknesses of the cell wall whereby one is thin and not pitted, while the other is thick and pitted as in the soft pines.

If upon the basis of the foregoing considerations, the various genera are arranged according to the law of frequency, they will fall in the order given in the subjoined table, where the sequence expresses the approximate relations in development as based upon purely structural grounds, but without attempting to finally determine the precise

affinities. In order to ascertain how far these results accord with those derived from general morphological data, the sequence may be compared with that given by Eichler. The principles employed in determining the sequence of genera, are as follows:—

1st. The eight characters which may be regarded as fixed and of primary importance, are assigned values in the order of their supposed development. They are indicated by x.

2nd. Characters which have become eliminated in the process of development, are assumed to have the same value as those which survive, and they are indicated by —

3rd. All sporadic characters are indicated by (1) but are assigned no value.

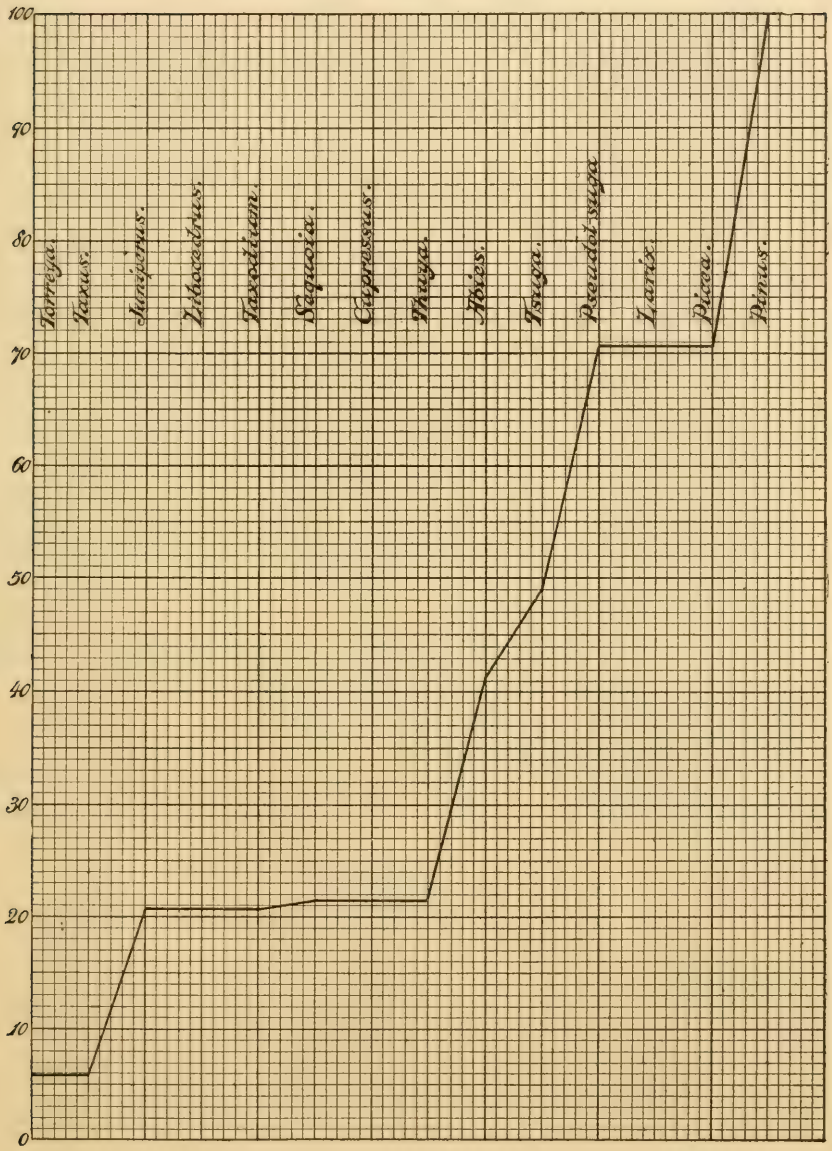
4th. The distribution of resin cells, being associated with an advanced development, are given the highest position in the series, but being of subordinate value as a character, only half values are assigned.

Sequence on the Basis of Anatomical Characters.	Spiral tracheids.	Uniseriate rays.	Resin cells.	Ray tracheids.	Resin passages.	Fusiform rays.	Thyloses in resin passages.	Ray cells of two kinds.	Resin cells in bands.	Resin cells scattering.	Resin cells on outer face of sum. wood	Numerical value.	Percentage value.	Sequence after Eichler.
	1	2	3	4	5	6	7	8	4·5	5·	5·5			
Torreya	x	x										3	5·9	Torreya.
Taxus	x	x										3	5·9	Taxus.
Juniperus	—	x	x	(1)					x	(1)		10·5	20·6	Juniperus.
Libocedrus	—	x	x						x	(1)		10·5	20·6	Cupressus.
Taxodium	—	x	x						x	(1)		10·5	20·6	Thuya.
Sequoia	—	x	x		(1)	(1)	(1)		(1)	x		11·	21·5	Libocedrus.
Cupressus	—	x	x	(1)					(1)	x		11·	21·5	Taxodium.
Thuya	—	x	x						(1)	x		11·	21·5	Sequoia.
Abies	—	x	x	(1)	(1)				—	—	x	21·	41·2	Abies.
Tsuga	—	x	x	x					—	—	x	25·	49·0	Tsuga.
Pseudotsuga	(1)	x	x	x	x	x			—	—	x	36·	70·6	Pseudotsuga.
Larix	—	x	x	x	x	x			—	—	x	36·	70·6	Picea.
Picea	—	x	—	x	x	x	(1)		—	—	—	36·	70·6	Larix.
Pinus	(1)	x	—	x	x	x	x	x	—	—	—	51·	100·	Pinus.

Bringing these results into comparison with the sequence established by Eichler on a more general morphological basis, it will be seen that there is a very general agreement, perhaps quite as much as could be expected to result from an examination of relationships from such diverse points of view. If further, we attempt to express these results by a curve, it will appear somewhat more clearly how certain genera fall into groups which do not necessarily imply genetic relationship, but rather the fact that similar positions in development have been attained by different genera quite independently, though along similar lines.

The precise significance of these facts cannot be determined from the limited amount of material at present available for that purpose, nor would it be wise to attempt the formulation of any final conclusions, but it does seem appropriate to point out that in considering any data in extension of the present studies, a correct interpretation of all the facts will be gained most satisfactorily in the light of the Mutation Theory which De Vries has so carefully elaborated. As leading to this end, the present facts suggest that

1. The various sporadic characters are tendencies toward higher phases of development which do not become fully expressed, and they therefore represent imperfect parallelisms along lines of development which attain full expression in other genera.
2. The occurrence of resin passages in Abies cannot be traced, at present, beyond existing species, and such structures afford no evidence, as yet, of phylogenetic value.
3. Sequoia represents a transitional group having a strong tendency to variation, with respect to the development of resin canals and fusiform rays in succession to the simple resin cells and uniseriate rays.
4. Sequoia gigantes represents the more stable member of the genus, deviations being most marked among existing species, in S. sempervirens.
5. Sequoia represents the terminal member of a short side line which passes through Taxodium and gives off further side lines as expressed in the formation of fusiform rays in S. burgessii, and imperfect resin passages in S. sempervirens.


North American Coniferæ.
Curve for Sequence in Development.
Torreya.
Taxus.
Juniperus.
Libocedrus.
Taxodium.
Sequoia.
Cupressus.
Thuya.
Thujopsis.
Tsuga.
Pseudotsuga.
Larix.
Picea.
Pinus.
100
90
80
70
60
50
40
30
20
10
0

EXPLANATION OF ILLUSTRATIONS.

1. *Taxodium distichum.* Transverse section. x 46.

Sequoia langsdorfii.

2. Transverse section. x 52.
3. Radial section. x 52.
4. Tangential section. x 52.

Sequoia burgessii.

5. Transverse section. x 46.
6. Radial section. x 52.
7. Radial section showing large thyloses in the resin canal of a fusiform ray. x 180.
8. Tangential section showing uniseriate rays, and large fusiform rays with resin canals filled with thyloses. x 52.

Cupressoxylon dawsoni.

9. Transverse section showing characteristic features of structure. x 52.
10. Radial section showing bordered pits in two rows. x 180.
11. Tangential section showing characteristic, uniseriate rays. x 52.

Pseudotsuga miocena.

12. Transverse section showing structure comparable with the fine grained "yellow fir." x 46.
13. Tangential section showing characteristic fusiform rays. x 150.

Rhamnacinium porcupinianum.

14. Transverse section showing characteristic features of structure. x 52.
15. Radial section showing the high and numerous rays. x 52.
16. Tangential section showing the fusiform, multiseriate rays. x 52.

Rhamnacinium triseriatim.

17. Transverse section showing the more numerous vessels of a more simple character than in R. porcupinianum. x 46.
18. Radial section showing the two kinds of cells and their distribution. x 46.
19. Tangential view of a ray through a uniseriate portion, interposed between multiseriate regions. x 200.
20. Tangential view of a triseriate ray of the more simple and more common form. x 200.

Rhamnacinium porcupinianum.

21. Radial section of a ray, showing in part, the different character of the cells and the perforations of the lateral walls. x 200.
22. Tangential section of a ray showing contact of the uniseriate and multiseriate regions. x 200.

Sequoia sempervirens.

23. Transverse section showing nature and distribution of resin passages. x 55.

24. a. Radial section through a resin passage showing epithelium cells on the left and parenchyma cells on right passing into tracheids with bordered pits. x 200.

b. Resin cells from the spring wood showing massive forms of resin. x 200.

c. Resin cells from the summer wood lying radially internal to a tracheid with bordered pits, and showing transitional form. x 200.

Sequoia gigantea.

25. Radial section showing at

a. Cells from the spring wood filled with resin. x 200.

b. Cells from the summer wood devoid of resin and of much greater length. x 200.

Abies bracteata.

26. Transverse section showing nature and distribution of resin passages. x 46.

27. Radial section through a resin passage showing the thick-walled epithelium cells on the left, immediately next to the canal, and elongated wood parenchyma cells with simple pits on the right. x 200.

Abies nobilis.

28. Transverse section showing structure and disposition of the resin passages. x 46.

Abies amabilis.

29. Radial section showing details of resin cells. x 200.

a. Tracheids of the wood parenchyma with bordered pits, the lower end coterminous with the upper end of

b. Resin cells of the ordinary type, with simple pits.

FIG. 1.

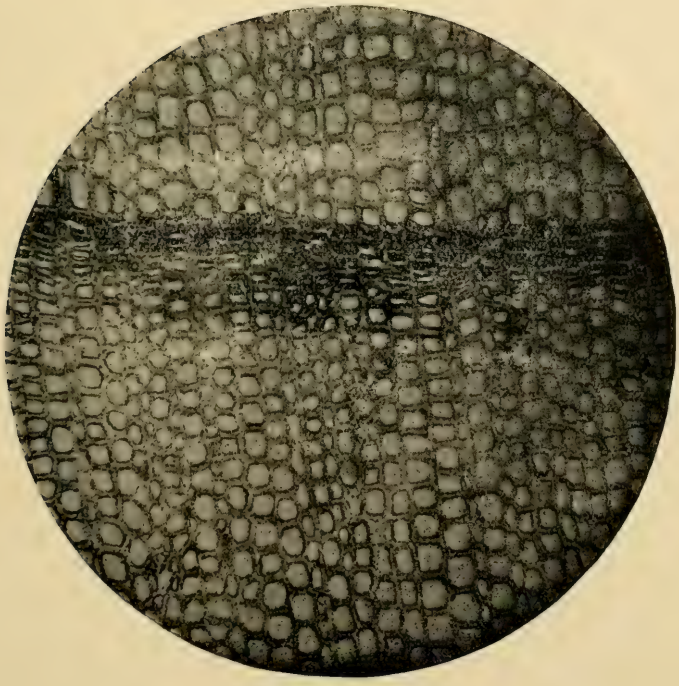


FIG. 2.

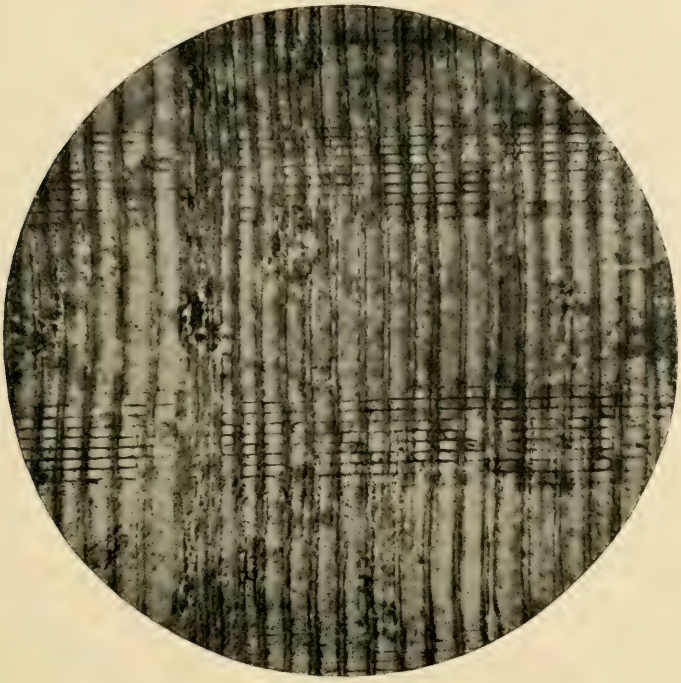


FIG. 3.

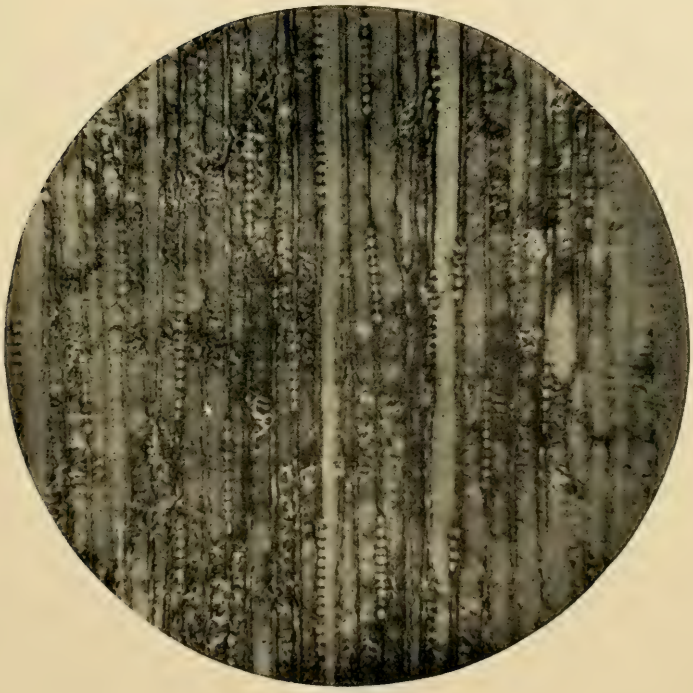


FIG. 4.

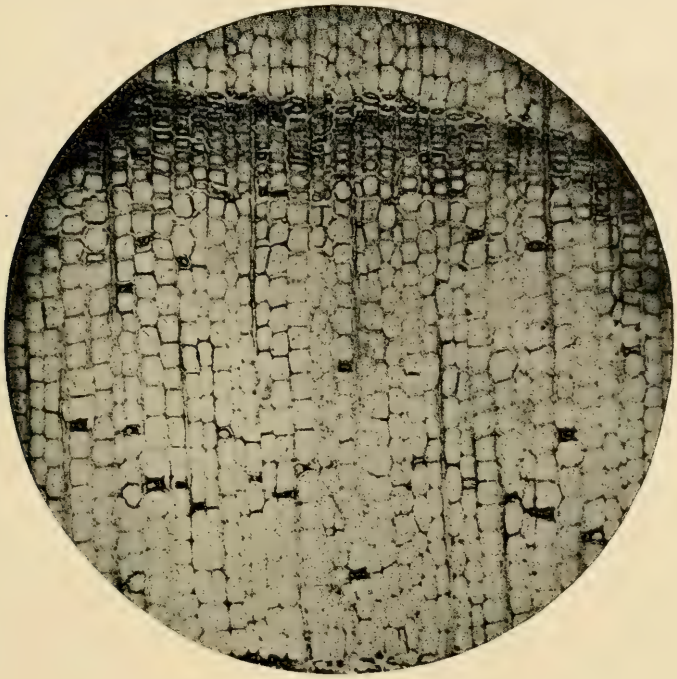


FIG. 5.

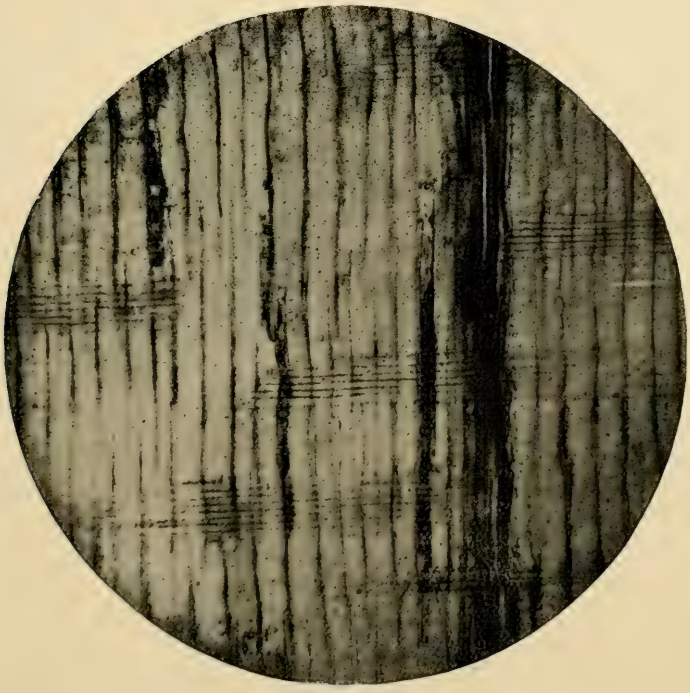


FIG. 6.

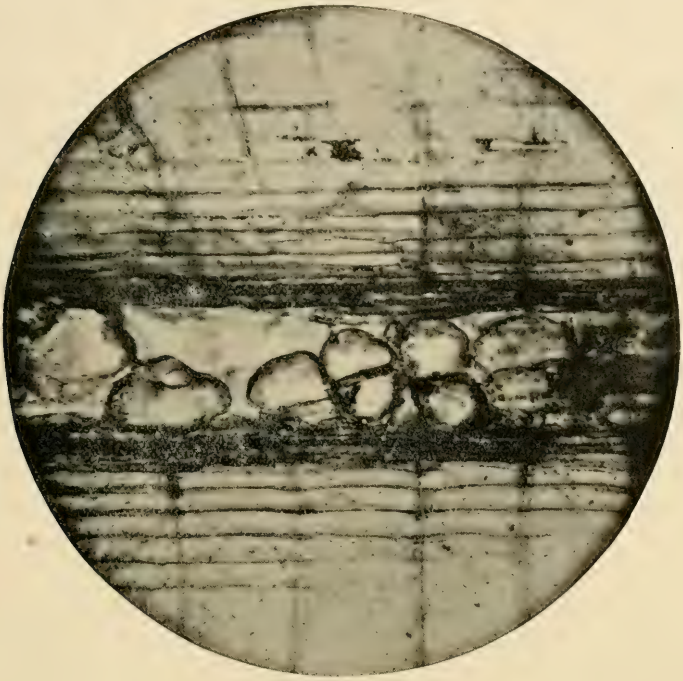


FIG. 7.

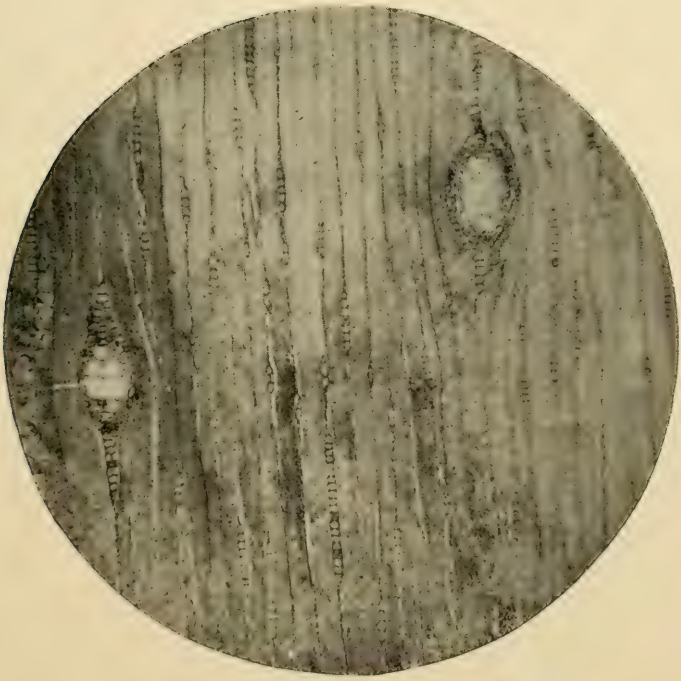


FIG. 8.

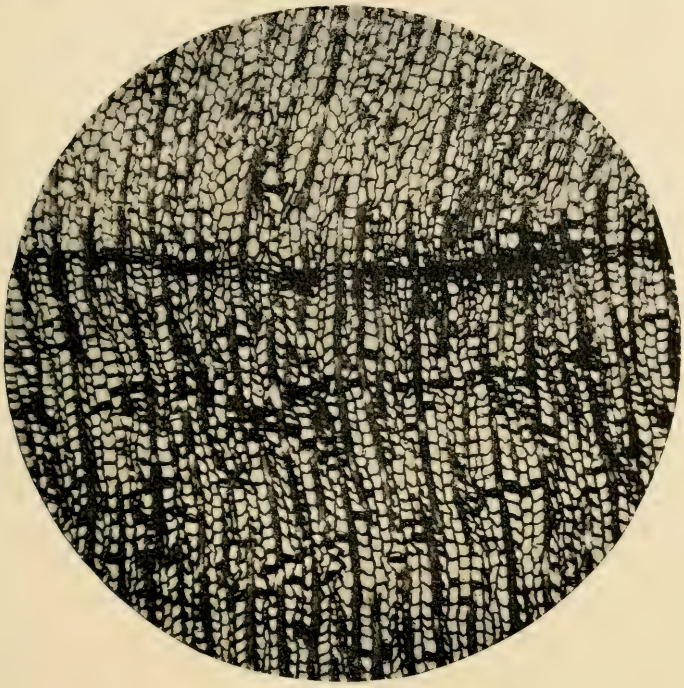


FIG. 9.

FIG. 10.

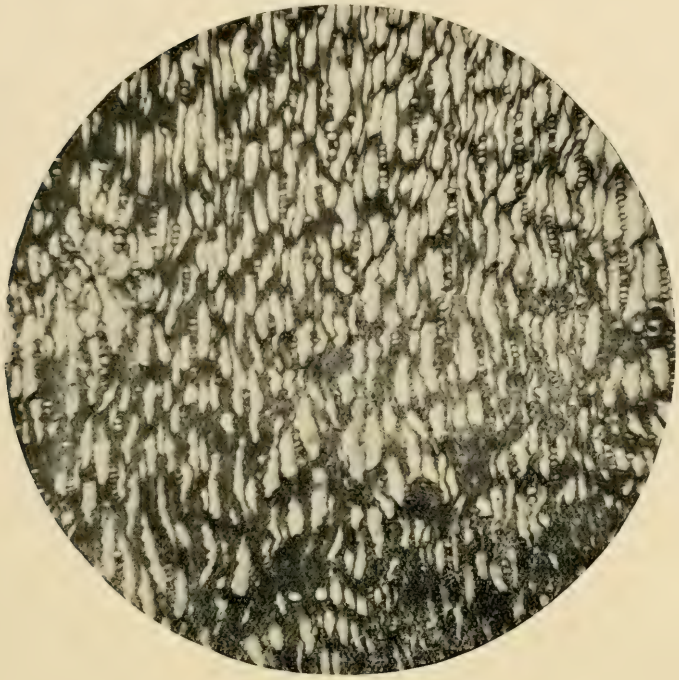


FIG. 11.

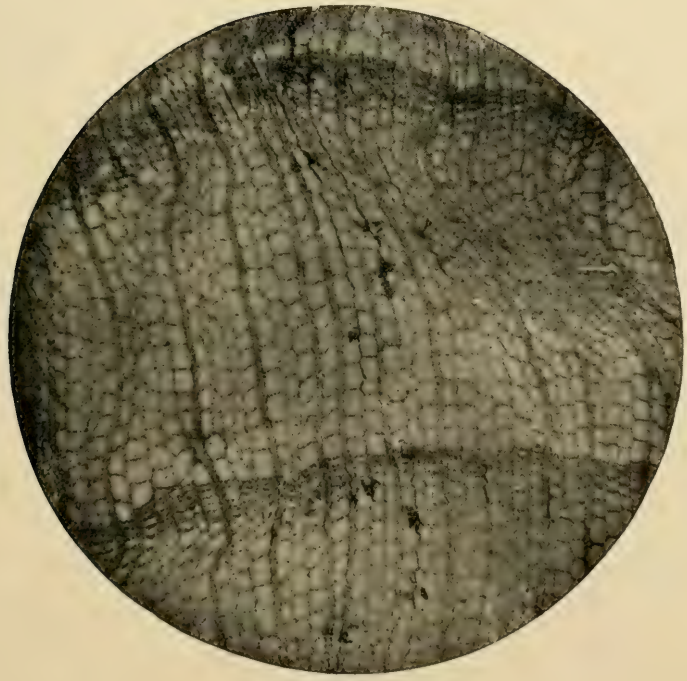


FIG. 12.

FIG. 13.

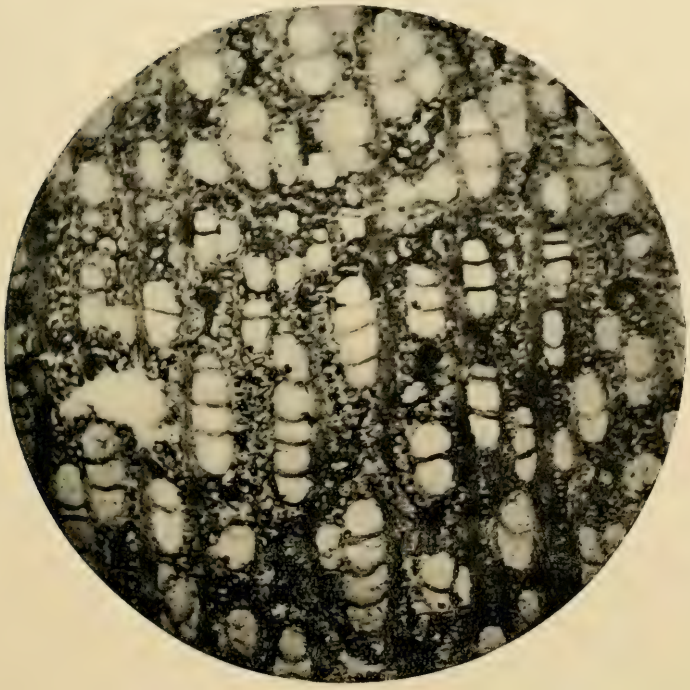


FIG. 14.

FIG. 15.

FIG. 16.

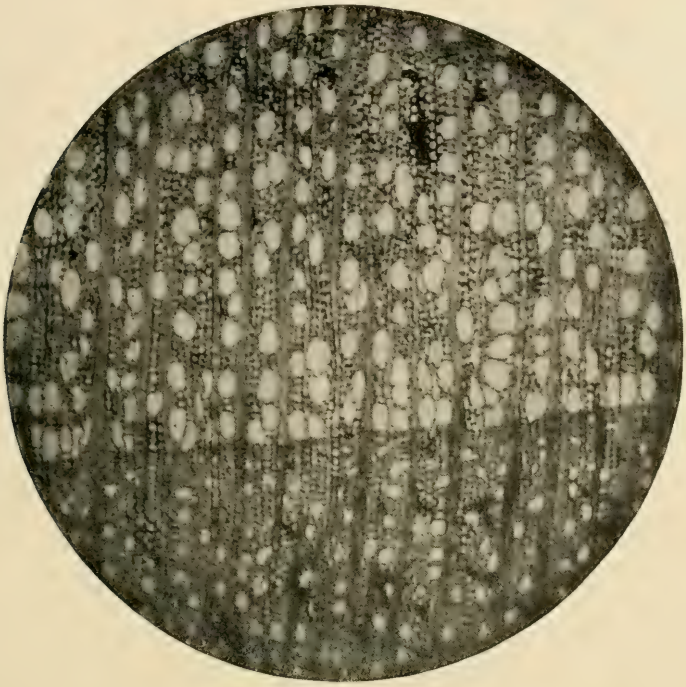


FIG. 17.

FIG. 18.

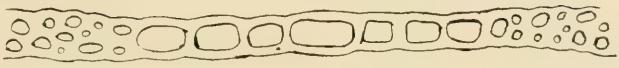
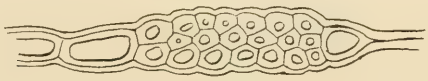


FIG. 19.



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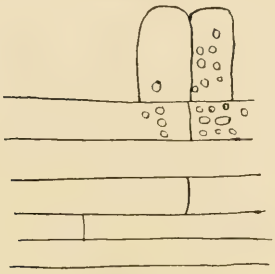


FIG. 21.

FIG. 22.

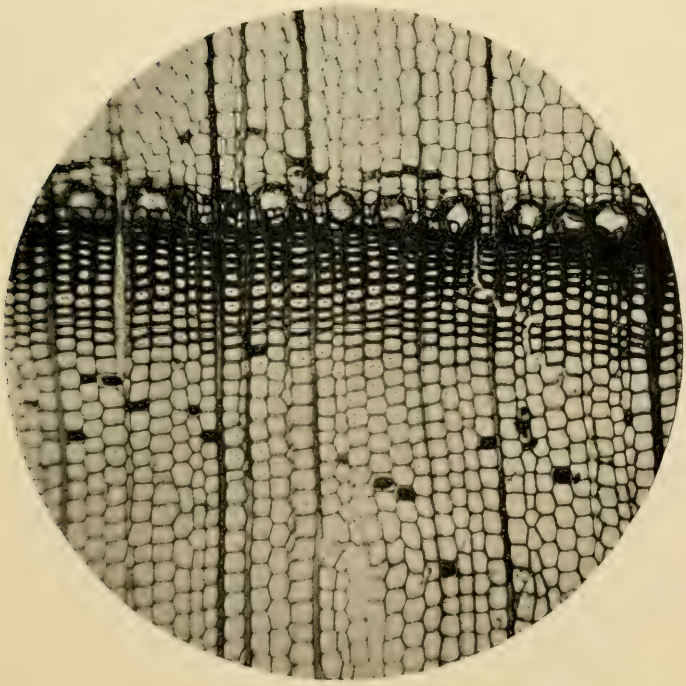
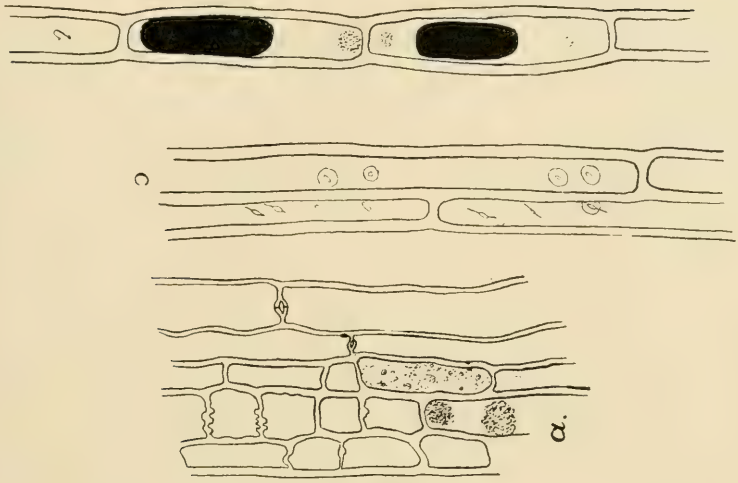


FIG. 23.



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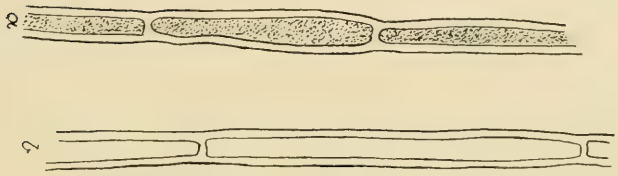

FIG. 25.

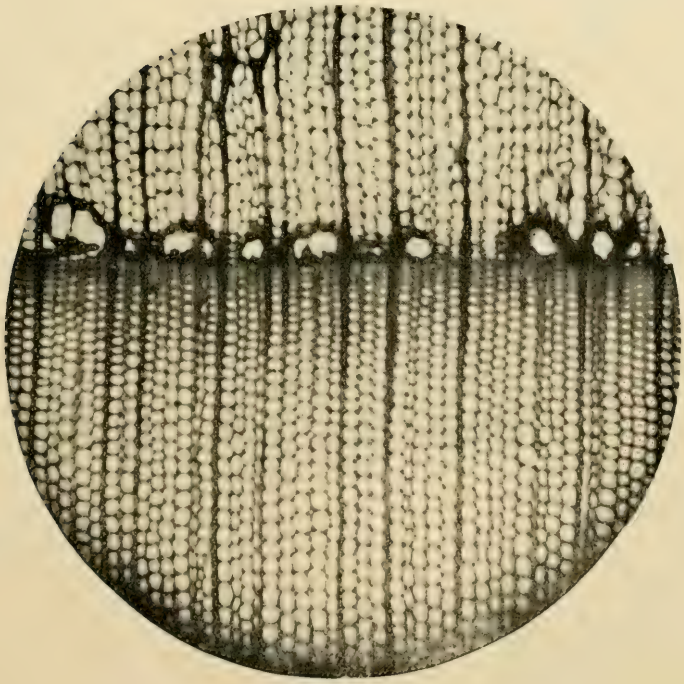

FIG. 26.

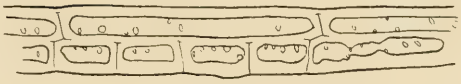

FIG. 27.

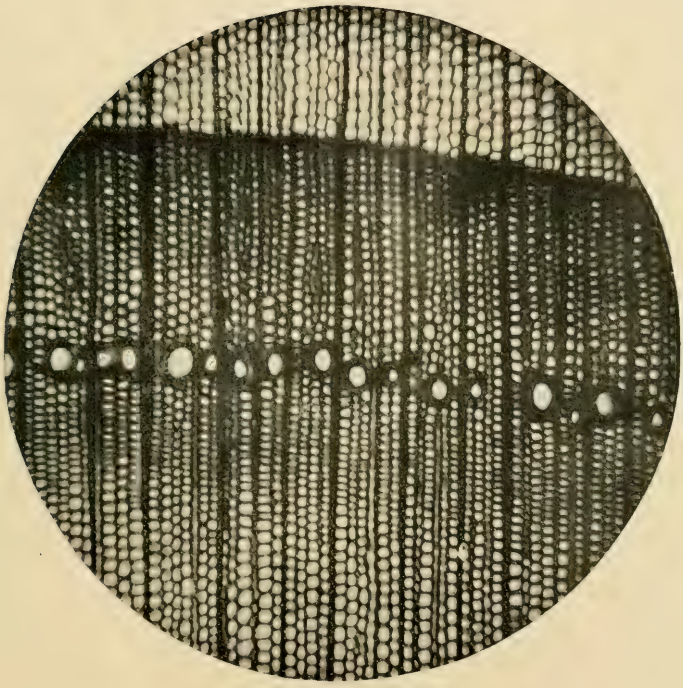

FIG. 28.

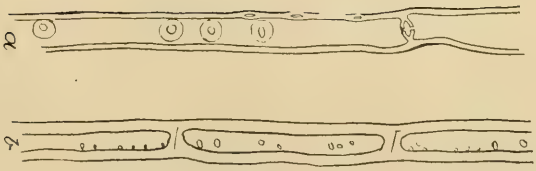

FIG. 29.

III.—*Notes on some Interesting rock-contacts in the Kingston District, Ont.*

By R. W. ELLS, LL.D.

(Read May 19th, 1903.)

In a former paper before this society the writer described in some detail the relations and distribution of the Potsdam and Calciferous formations of the Ottawa and St. Lawrence basins. It was there pointed out that no stratigraphical break occurred between the two, but that the Potsdam sandstone division, as developed in Canada, represented merely the downward extension, through transition beds, of the Calciferous division in which the rocks are to a large extent dolomitic, into sandstones and conglomerates in which calcareous matter is practically absent.

Since that date much detailed work has been done by the Geological Survey in the area bounded by the St. Lawrence, Ottawa and Rideau rivers, and the extension of the latter water-way southward along the line of the Rideau canal to Kingston. The rocks which surround the Archæan axis which extends across the St. Lawrence river from Ontario into the state of New York, crossing that river between Brockville and Kingston, have been mapped over a large area.

The distribution of several of the lower members of the Palæozoic series in this district is somewhat irregular. Thus on the eastern side of the Archæan axis the several formations, from the basal beds of the Potsdam to the top of the Lorraine, succeed each other with great regularity, except where their normal position is disturbed locally through the agency of faults, while on the south side several important gaps occur, owing to local peculiarities of deposition, so that the actual sequence of formations there seen is quite different from that found on the north side of the axis.

The rocks of this Archæan axis consist of granites, granite-gneiss, crystalline limestone, quartzite, etc., which are similar to those of the Grenville series north of the Ottawa river, and are undoubtedly the continuation of this series to the south-west, both in eastern Ontario and in the northern portion of the state of New York east of the St. Lawrence. The granites occur sometimes as large masses and sometimes as dykes and are generally reddish in colour. They cut all the rocks of the Grenville series proper, and are, therefore, regarded as of later date. In the intermediate basin of the Ottawa these rocks were eroded prior to the deposition of the Palæozoic sediments, so that there is a wide valley

between the crystalline series of the Ottawa and that of the Kingston-Brockville area, which is now occupied by these newer sediments.

While there are many interesting contacts visible at different places as the result of the intrusive nature of the granites through the other crystalline rocks of the Grenville and Hastings series these have been so frequently referred to in various papers and reports that they need not here be further considered. The same remark also applies to the peculiar faulted contacts east of the St. Lawrence, which occur in connection with the great Champlain fault. The object of the present paper is to describe some of the contact phenomena which are visible in connection with the deposition of the Palæozoic sediments upon the eroded surfaces of the crystalline rocks of the Kingston district.

In the portion of the province of Quebec, west of the Champlain fault, as well as in eastern Ontario, the Potsdam sandstone forms the lowest division of the Palæozoic series and is regarded by Canadian geologists as representing the base of the Cambro-Silurian or Ordovician system. Its thickness in Canada is nowhere great, rarely reaching 100 feet, except in the area adjacent to New York state east of the St. Lawrence, the thickness of the formation evidently increasing in that direction, but south of the Canada line it develops rapidly and has a thickness of some hundreds of feet. It is here, by the United States geologists, regarded as forming the upper member of the Cambrian system from the presence of Cambrian fossils in the lower portion of the formation, though the transition beds into the overlying Calciferous are the same on both sides of the St. Lawrence.

In many places throughout the Rideau-Kingston district the basal beds of the Potsdam formation consist of a coarse conglomerate which is made up of pebbles of the old crystalline rocks, sometimes of large size, and well rounded, embedded in a sandy but sometimes calcareous paste, the latter being usually found when the conglomerate rests upon the crystalline limestone as is occasionally the case along the Rideau lake, where this basal conglomerate is in places well displayed.

This conglomerate passes upward into more regular sandy beds in which there are occasional layers also containing pebbles which, however, consist for the most part of white quartzite, and these sandstones graduate upward without break into strata which become calcareous till the rock finally passes into a dolomitic limestone which constitutes the Calciferous formation.

Between the sandstone proper and the dolomite there are certain layers known as the transition beds which range in thickness from five to forty feet, and these are often highly fossiliferous, the fossils being

generally silicified and standing out of the sandy portion of the strata, through the decomposition of the calcareous portion of the layers.

In the lower part of the Ottawa river basin the regular succession of formations continues upward till it includes the red Medina shales; but ascending the river above Ottawa city the lower divisions gradually disappear and the rocks which rest upon the original floor are successively higher in the scale, till on Lake Temiskaming these consist of the Upper Silurian limestones. A similar condition of deposition is found along the north side of the lower St. Lawrence. Thus, at the St. Maurice in rear of the city of Three Rivers the Potsdam sandstone rests upon the crystalline rocks, but farther east this sandstone disappears till in the vicinity of the city of Quebec the Trenton limestone is the lowest formation, the contact of this with the Archæan gneiss being well exposed on the Ste. Anne river, a short distance above the Montmorency Falls.

In the area south of the Rideau lake and thence to the St. Lawrence at Brockville and for some miles east, the Palæozoic formations are practically confined to the two lowest divisions. On the upper Rideau lake, however, the succession upward again includes the Chazy shales and limestone which cap the nighest part of the ridge south of that lake in the township of Crosby, between Newboro and Westport. In this area the overlying formations, if ever deposited, have all been denuded. In the great area between the Ottawa and the St. Lawrence it is very probable that several of these upper formations at one time existed, since traces of several of them are still found at widely separated points throughout this portion of the province.

Along the St. Lawrence river, as far west as a point midway between Gananoque and Kingston, the passage beds between the Potsdam and Calciferous can still be recognized; but west of a line drawn from this point to the upper end of the Rideau chain of lakes the Calciferous is not seen with the single exception of the area in Crosby referred to. At many places the only remaining deposit is the sandstone which is found at intervals along the St. Lawrence to within a few miles of Kingston and at a number of places along the line of the Rideau canal to the height of land at Newboro on west Rideau lake. Where the Potsdam sandstone is not developed in this area the lowest sediments consist of a few feet or sometimes inches of a greenish marly shale or sometimes an arkose which fills in the hollows of the underlying granite or gneiss.

Frequently in this area the overlying rocks directly upon the sandstone are bluish limestones with shaly partings, which, in physical characters, strongly resemble certain beds of Chazy age which occur in the Ottawa basin. Where the sandstones are not deposited these limestones rest directly upon the granite or other crystalline rocks of the old

series. This overlying limestone series first comes into view along the road between Kingston and Gananoque, near what is known as Pitts Ferry, and as the lowest beds of the limestone hold fossils which have been determined as belonging to the Black River formation, there is a manifest gap in the regular sequence through the lack of deposition of the Chazy shales and limestones. The Calciferous dolomites are also practically absent in this place.

At Barriefield opposite Kingston city, and for several miles to the north along the shore of the St. Lawrence as well as on the roads in this direction, and along the course of the Rideau canal northward, the sandstone itself is absent and the limestones of Black River age are the lowest member of the Palæozoic series. In some places these are underlaid by thin beds of arkose forming a marly deposit of a greenish-grey colour, and holding small scattered pieces and coarse debris of the underlying reddish granite, and these beds pass upward directly into the limestone portion. In places these marly beds contain fossils among which a small orthoceratite is the most abundant, and in some layers these are very numerous. In so far as these have been examined they represent species which may possibly pertain to the Chazy, though the evidence points rather to Black River forms.

These contacts of the Black River limestones with the underlying crystallines are at the same level as the contacts of the Potsdam sandstone elsewhere in the vicinity. The limestone formation of Barriefield and of Kingston city extends northward along the canal for some miles without any intervention of the sandstone. Occasionally the lower beds hold fossils among which a *Leperditia* is probably the most plentiful, and pieces of *Tetradium,* apparently *T. fibratum* occur.

In the southern part of Kingston city these limestones, which contain hard and dolomitic fine grained beds resembling lithographic stone, pass upward into massive limestones which abound in large fossils of characteristic Black River age such as *Stromatocerium rugosum, Columnaria Halli, Tetradium fibratum, Actinoceras Bigsbyi,* etc., with other forms which are found throughout the formation as developed in the Ottawa basin. All the strata lie in a nearly horizontal position except where deposition has occurred on a sloping rock surface such as a rounded granite or other crystalline rock mass, when the strata conform in dip with the slope of the underlying rock and sometimes present a qua-quaversal structure.

A similar arrangement of strata and formations is seen in the state of New York, adjacent on the east side of the St. Lawrence river. Thus, in the area east of that part of the river between Brockville and Prescott, the Potsdam is succeeded upward by the Calciferous or Beekman-

town formation, and this in turn is overlaid by the Chazy in regular order as in the Ottawa basin; but on the south side of the great Archæan mass in that state, while the sandstone is well exposed in a number of places, and has there been fully described under the name of the Potsdam formation, and the Calciferous is also occasionally seen, the Chazy formation appears to be absent as in the area about Kingston, and the Black River frequently appears to be the lowest member of the series developed. While the intimate association of the Chazy and Black River to the Potsdam formation as found in New York may be to some extent explained by the agency of faults by which the intervening Calciferous has been cut out this is not always the case, and in the Kingston district in Ontario the superposition of the Black River formation upon the sandstone or on the crystalline rocks cannot thus be accounted for.

On Howe Island in the St. Lawrence, about three miles above the town of Gananoque, several of these relations are well seen. On the east end of the island the underlying rock is a reddish granite, in places with gneissic structure, and on this are a few feet of sandstone with interstratified beds containing scattered pebbles of quartzite from the adjacent rocks of the Grenville series. Similar features are seen in the unmistakable Potsdam rocks of Charleston lake and at other places where these beds are overlaid by Calciferous dolomites, so that there is but little reason to suppose that the sandy beds along this part of the St. Lawrence are assignable to any higher horizon. Going west along the island the sandstones are overlaid by blackish-grey or dark cherty and sometimes nodular limestones which extend along the shore for a distance of a mile into Rush Bay. Here there occurs a heavy series of shales, grey, green, red and black, which in some respects resemble portions of the lower Chazy of the Ottawa basin. They pass upward directly into dolomitic limestones with interstratified shale bands, similar in character to the limestones of Kingston and Barriefield. The only fossils seen in these shales are a species of Leperditia, but the limestones are apparently of Black River age, representing the lowest portion of that formation. It is possible, however, that some of the lowest beds may be referable to the Chazy formation, but even in this case the whole of the Calciferous is lacking.

One of the most readily accessible localities where some of these interesting contacts may be observed is at Barriefield hill opposite Kingston. All around the shores of the lower part of Lake Ontario the rocks consist of hard, dark, often dolomitic limestones, as well as on the shore east of Kingston harbour, but in Deadman's Cove, which is on the east side of Barriefield ridge, the red granite outcrops in large masses. The surface of the granite has been eroded and the irregulari-

ties are filled in with a deposit of greenish arkose or calcareous marl which in places has a thickness of a foot or more and which forms the lowest part of the limestone series. There is here no trace of the sandstones or of the Calciferous dolomites. On the crest of the hill are several outcrops of the granite around which the limestone has been deposited, the strata dipping from it in every direction at angles of ten to fifteen degrees, while elsewhere the limestone is in a nearly horizontal attitude.

The limestones extend west to Kingston Mills on the Rideau canal, forming an escarpment north of the Cataraqui river. Near the Mills which place is marked by a series of locks on the canal, the granite and gneiss again appear, and the same contact of the limestone is here observed as at Barriefield. On the line of the Grand Trunk railway, south of the canal crossing, a heavy cutting has been made in the granite, which is continued southward into the contact formation of arkose and limestone for a hundred feet or more. Just at the contact with the granite the shaly arkose contains an abundance of fossils, mostly small orthoceratites of a species which are rarely elsewhere found in the rocks of this area, resembling what has been described as *Nanno*, var. *aulema*. These are closely packed together as if deposited on a shore by the action of waves, which have forced the organisms against the granite shore line. The marly arkose at this place has a thickness of four to six feet and passes up into hard dolomitic limestones practically devoid of fossils, as is the case with much of the lower portion of the limestone formation of this area. The elevation of the railway in this cutting is about 66 feet above the shore of Lake Ontario. In the lowest beds of the limestone formation resting on the granite east of the locks at this place a Leperditia, similar to that found on Howe island, also occurs with other fossils of Black River age.

Further west in the township of Camden East, orthoceratites similar to those which occur in the cutting at Kingston Mills are found in a similar green marly shale and arkose, resting on crystalline rocks. These fossils apparently represent the lowest fossiliferous zone of the limestone formation in the basin west of Kingston.

Going northward along the line of the canal above the locks at Kingston mills, after passing an area of granite and well bedded gneiss and quartzite which form a somewhat prominent feature along the east side of the area of drowned lands above the locks, an area of Potsdam sandstone with conglomerates in the lower part comes to the river. The sandstones are both reddish and gray in colour, the former tint being due to the presence of disseminated red hæmatite. The pebbles in the conglomerates are mostly of white quartz, and

some of the strata of the sandstone show much false bedding. This locality is locally known as Gildersleeve's quarry.

These Potsdam strata rest upon the eroded surface of granite and gneiss with which are occasional bands of crystalline limestone. They have a thickness of not far from 60 feet, and lie in a nearly horizontal position, except where inclined, owing to conditions of deposition on an irregular floor. They do not show any sign of faulting, and are capped directly a short distance inland by Black River limestone with thin shales at the base. The limestones are precisely similar to those seen at Kingston and Barriefield hill, and the whole series, including the sandstones which thin out at the eastern limit to a few inches only, rest in a basin on the Archæan rocks. No fossils are found in the sandy beds, with the exception of Scolithus markings, but there are a number of concretions, the most important of which assume the form of long cylindrical tree trunks which stand upright in the sandstone and have a length of thirty to forty feet, with a diameter of three to four feet. Around the base of the quarry are also a number of rounded, generally small concretions which by the quarry men have been regarded as representing the fruit from the supposed fossil trees. These smaller concretions are found at several other localities where the similar sandstones are developed, as about Knowlton lake.

Further north the sandstone beds occur at a number of isolated points as at Jones Falls and around the shores of several of the lakes along the canal route, but the overlying sandstone formation is not seen nor any trace of the Calciferous till we reach the outcrops at West Rideau lake already referred to.

To the west of the Rideau canal similar deposits of sandstone are to be seen at several places, in the area north of Kingston. Around the shores of Dog lake they form cliffs and have a thickness of 75 to 100 feet, with interstratified irregular bands of conglomerate. The rock is both red and gray and the formation contains pockety deposits of red hæmatite, some of which are sufficiently large to mine locally.

Among the most interesting of these contacts are several seen around the south side of Loughborough lake near the village of Battersea. Very full descriptions of the rocks of this locality have been given by Mr. A. Murray in the Report for 1852-53, now long out of print

The sandstones are seen both along the south side of the lake at this place as well as along the road thence to Dog lake. About the village of Battersea, which is underlaid by massive red granite for the most part, the sandstone, both red, white or gray, forms irregular shaped areas resting on the granite, and on the lake shore it is seen in

low cliffs, of from 10 to 40 feet in height. As to the general character of the sandstone, Murray says, "The rock is for the most part of red and greenish colours, generally fine grained, having pebbles of opaque white quartz distributed scantily and irregularly through it. At some parts it is of a pale greenish colour, striped with reddish or yellowish layers, and at others it is a nearly pure white, fine-grained siliceous sandstone. Some portions also are bright red and very ferruginous, and others are a coarse quartz conglomerate."

The sandstones are frequently penetrated by cylindrical markings which are probably the *Scolithus linearis* of Hall. Capping the sandstone directly a few feet of a green marly rock occurs, which passes directly upward into the limestones, which are frequently dolomitic and form a lithographic stone. These form escarpments of fifty or more feet in height and surround the entire south half of the lake, where they are capped by the characteristic massive limestones of Black River age with fossils of that formation. These massive beds occur at about 100 to 150 feet from the base of the limestone series. There is no trace of the Calciferous in this direction nor of the Chazy formation unless, indeed, certain beds of the lower portion of the limestone formation may be assigned to that horizon, which in view of the fossil determinations in similar limestones and shales near Kingston does not now seem to be possible.

Similar conditions as to deposition of the Potsdam sandstone and the overlying limestone formation are also to be seen at the south end of Knowlton lake further to the west where also the surface of the red sandstones is marked by the occurrence of sub-globular, concretionary ferrugino-arenaceous masses, sometimes as large as an orange, but oftener about the size of a walnut, giving the surface a mammillated structure. In the overlying limestones at the base the small fossil Leperditia is in places quite abundant.

The most westerly of these contacts is seen along the line of the Kingston and Pembroke railway about two miles north of Harrowsmith station. Here the crystalline rocks, for the most part granitic, are well exposed to the east of the railway and are capped by a few feet only of red and green sandstone. These are overlaid by a small thickness of green marly shales which constitute the base of the limestone escarpment; the position of all the beds throughout, from the base of the sandstones to the top of the limestones is uniformly nearly horizontal, and nowhere is there any evidence of unconformity between the two series though the Calciferous and Chazy formations are absent.

The principal point at issue in the study of these contacts as shown on the two sides of the Archæan axis of the Brockville-Kingston area is the difference in the relative succession of the several forma-

tions between the Potsdam formation and the Black River limestone formation. This is further accentuated by the fact that differences of elevation do not apparently affect the peculiar conditions of deposition over large areas.

An illustration of this peculiarity of deposition is seen in the sandstone area in which Gildersleeve's quarry is located. Thus, at the quarry itself the sandstone has a thickness of not far from 60 to 70 feet, but at the eastern side of the basin, about two miles distant, the exposed thickness is only a few inches, and at Kingston mills, a few miles further east, at the same level there is no trace of the sandstone at all. There is no sign of faulting anywhere in these rocks.

Owing to the apparent stratigraphical conformity between the lowest sandstones and the overlying formations there is no visible reason why the Calciferous dolomites should not succeed the Potsdam sandstone on the south as well as in their regular order on the north of the axis. Murray, in 1852, records the presence of calcareous sandstone further west, in a section on the Crow river near the Marmora iron works, with light brownish gray limestone and greenish shales which underlie the lithographic beds of the district, the lowest portion of which he regarded as possibly of Calciferous age, with a thickness of about twenty feet, while the next twenty feet of the section might be possibly regarded as of Chazy age, the upper portion being characterized by the peculiar large fossils of the Black River formation as in the southern part of Kingston city. It is possible, however, that with the exception of six to eight feet of the basal beds which rest upon the gneiss and which may probably represent the Potsdam, the rest of the section is the equivalent of that seen on Howe island in the St. Lawrence or the lower beds of Barriefield hill and Kingston Mills. Unless it is possible to correlate the lower 100 feet of this limestone series with the Chazy of the Ottawa basin it is necessary to extend the Black River formation downward to a very much greater thickness than is found anywhere else in eastern Ontario, since the true Black River strata with the characteristic fossils of the Ottawa river basin occupy only the upper portion of the formation. In this case we must conclude that the fossils of the lower part, which are few in number comparatively speaking, must pertain to the upper Chazy, notwithstanding their apparent resemblance to some forms found in the Black River limestones elsewhere. That is certain forms must be common to the two formations of the Chazy and Black River limestones. Even then we have no trace of the lower portion of the Chazy represented in the Ottawa basin by about 100 feet of

greenish and sometimes red coloured shales, or of the dolomites of Calciferous age.

From a consideration of the facts regarding the deposition of the several formations of Palæozoic age in this district, it would seem that in this portion of the province of Ontario as also in a part of the state of New York adjacent on the east, the regular sequence of these formations has been affected by causes not directly observable at the present time, by which certain members of the geological scale have been omitted. Such gaps have not been caused by faulting, but are due rather to local differences in elevation which have affected certain portions of the area in question, since practically on the same present general level, and within a comparatively limited space, we find different formations ranging from the Potsdam to the Black River, constituting the lowest beds which rest upon the Archæan floor. Otherwise, if we regard the several formations from the Potsdam upward as having been deposited with equal regularity, it would appear that prior to the deposition of the lower portion of the Black River formation, both the Calciferous and Chazy with, in many places, all the Potsdam have been removed by denudation before the Black River limestone was deposited. In this case it is remarkable that all the similar formations on the north side of the Archæan axis, a short distance to the north, should have escaped such denudation, especially in view of the fact that the whole country northward from the vicinity of Kingston to the Ottawa is comparatively level and not now affected by marked elevation in any part.

From an examination of the logs of several deep borings, made in the townships of Bertie and Willoughby in the Niagara peninsula, it would appear that similar gaps in the geological scale to those which occur in the Kingston district are a feature of the district. In two of these borings which were sunk to a depth of over 3,000 feet in the search for natural gas, the succession of formations downward is regular from the Onondaga to the Trenton, but the next underlying formation was found to be a yellowish sandstone, regarded by the drillers as of Calciferous age, but which may represent some portion of the Potsdam sandstone, since throughout the eastern area the true Calciferous consists for the most part of dolomitic limestone. In this case the Black River, the Chazy and the Calciferous dolomite are all absent, so that the conditions of deposition in that district are similar to those already described as occurring at and near Kingston.

It would, therefore, appear that some marked but well defined change of level occurred in the area south of the Kingston-Brockville Archæan axis at the close of the Potsdam, which was also materially reduced in thickness. This is in marked contrast to the conditions

which prevailed north of that axis throughout the Ottawa basin; and it may be supposed that, at a certain stage in the deposition of the sandstone formation, the surface was raised above the level of the sea and so remained till the beginning of the Black River time throughout the whole extent of Lake Ontario. Then by gradual subsidence the conditions for the deposition of the Black River and Trenton limestones were again resumed, at first in shallow water, producing shales and fine conglomerates until the submergence gradually became greater, so that marine limestones were laid down, and the succession of formations upward thence continued in regular order. The reasons for these apparently somewhat sudden and, in places, local changes of level at the period of deposition of these old sediments have not yet been satisfactorily explained.

Such peculiarities of deposition are not, however, confined to the part of the St. Lawrence basin under consideration. Similar unequal phases of elevation and subsidence are readily recognized in the Ottawa basin; in that part of the province of Quebec north of the St. Lawrence river below Montreal; and in New Brunswick and Nova Scotia.

Thus, on Lake Nipissing at the head of the Ottawa river basin on the west, the lowest sediments, resting on the crystalline rocks, have been found to contain fossils of Black River age, while in the same basin at the northern end of Lake Temiskaming, the basal beds belong to the horizon of the Niagara formation or are a part of the Upper Silurian series. Along the lower St. Lawrence below Montreal, the Potsdam, Calciferous, Chazy and the succeeding formations are regularly developed as far east as the St. Maurice river; but, below this, the Laurentian rocks are overlapped successively by the Calciferous and newer formations until at the Montmorency Falls below Quebec the basal beds upon the gneiss are of Trenton age. This irregularity in deposition is not due to the agency of faults on the north side of the St. Lawrence, though great displacements of strata are due to this cause in the country to the south.

In New Brunswick there are many gaps at different points. Some of these apparent unconformities are due to faults, but in the eastern area along the Gulf of St. Lawrence, the rocks of the great Carboniferous basin which consist for the most part of conglomerates, sandstones and shales of the Millstone grit division, are directly overlaid by soft red beds of upper Carboniferous, or, as they are sometimes styled, of Permian age. In this case the great thickness of strata belonging to the productive coal formation which are so well developed in the Springhill, Pictou and Sydney basins of Nova Scotia, are practically absent and have apparently never been deposited. Similar overlaps of the upper formation upon Millstone grit or lower Carboniferous are seen in the last named province along the south side of Northumberland

Strait, in the counties of Cumberland, Colchester and Pictou. These unconformities evidently represent periods of elevation extending for long intervals of time, in which the rocks of the Millstone grit division were raised above sea-level and again became submerged at the beginning of upper Carboniferous time. So also about the shores of Minas basin, the soft red beds of Triassic age were deposited upon Devonian or lower Carboniferous sediments, showing in this case even greater intervals or gaps in the deposition of the Carboniferous strata. It is evident, therefore, that these gaps or breaks, sometimes of great extent, in the order of deposition, cannot be assigned to any one period in the earth's history, but have affected many formations, ranging from the earliest of the sedimentary rocks to those which in eastern Canada are regarded as the most recent in order of time.

IV.—*An attempt to classify Palæozoic Batrachian footprints.*

By DR. G. F. MATTHEW.

(Read May 21st, 1903.)

Having had occasion to seek generic names for certain Batrachian and other footprints obtained at the Joggins shore in Nova Scotia, which have just been described in the Bulletin of the Natural History Society of New Brunswick, I was surprised at the diversity of usage which prevails in the application of generic names to these impressions.

The name Sauropus was used by Lea in 1849 for a common form of track of the coal measures, and was applied by Dr. J. W. Dawson and others to footmarks of the Palæozoic. But Dr. O. P. Hay says this name was given to tracks of Triassic age by Hitchcock, (presumably at an earlier date), he therefore substitutes Palæosauropus for all the Carboniferous tracks called Sauropus by authors.

This claim of the inapplicability of Sauropus to the Palæozoic forms is not without reason, for undoubtedly the animals which made the footmarks on the Carboniferous mud flats were of different genera from those which wandered along the shores of Triassic estuaries.

But as the forms which bear the name of Sauropus, and were produced on the Carboniferous flats are quite diverse from each other, they cannot all come under one generic name, of Palæosauropus; *Sauropus primævus* of Lea, for instance, is quite different from *S. Sydnensis* of Dawson. Other species included under Palæosauropus can with advantage be included under generic names given by other writers, previous to the publication of Dr. Hay's list.

For the type of footmark represented by *Sauropus primævus,* no less than four different generic names have been used, these being given to as many different species, these are Thenaropus, Notolacerta, Anthracopus and Sauropus. And a similar diversity of generic names may be found in several other groups of these footprints.

To find a common basis of classification is difficult. There is suggested as a primary division the grouping into Urodela and Anoura of the recent Amphibians; but setting aside the fact that the relation between the Labyrinthodonts (which probably made most of the Palæozoic footmarks), and the orders of modern Amphibians above named, is a distant one, the impression of the tail in these tracks where it does occur is very unreliable. In some the supposed print of the tail is so heavy, as to raise the suspicion that some other marking has been mistaken for it; in others the trail occurs intermittently, and in others it occurs in an impossible relation.

Also it may be remarked that the supposed *tail* mark may in some cases, if not in most, be due to the belly dragging along the mud or sand, on which the impressions have been made. The exactness with which the "tail" mark usually runs along the middle of the space between the foot-marks appears to point to such an origin. And this is noticeable even where the track is curved, and where one might expect the tail mark to sweep toward the outer side of the curve. In the case of one track this "tail" mark was found strongly marked on the crests of the ridges of a Carboniferous ripple-marked layer, and yet the sand was so firm that no footprints were preserved.

In the scheme given in the following list the basis of arrangement is the number of toes, as shown by the prints on the layers of the rock, and as a subordinate character the weight and strength of the impression.

Sir William Dawson has used the form of the impression as a basis of classification and divides these footmarks into Hylopus (="digitigrade"), and Sauropus (=" plantigrade"). In this way he has associated together footmarks of a type which other writers have separated. His classification brings together the prints of animals that had five toes and (though with a question mark) others that had three, into one genus. Also, it brings together under Sauropus, *S. unguifer* in which the tracks are near the usual chirotherian pattern, and *S. Sydnensis*, a species which had an elephantine tread.

E. Butts is also broad in his use of his genus Notolacerta, which contains digitigrade prints, with five toes on each foot, and plantigrade prints with five toes on the hind foot and four on the front.

Apart from the fact that O. C. Marsh noticed and indicated by several generic names the variations in the form of the footprints described by him, the chief cause of the diversity of genera in the Palæozoic footprints is that each author has described only one or a few prints, and each has given new generic names. It is to reduce this redundancy of names to something like method and order, that the author has undertaken to present the following list, in which the footmarks are divided into related groups with leading generic names.

This arrangement is only to be considered tentative, and is arbitrary in that one character, namely the number of toe marks of the hind and fore feet is chiefly relied on for classifying. The arrangement is also incomplete, in that the author has not sufficient information of some species that have been described, to place them in the series. And, furthermore, it should also be stated that no attempt has been made to classify with these Batrachian tracks, others that may have been described from the Palæozoic deposits of Europe.

For the convenience of those wishing to use the "tail" impressions as a means of distinction, a separate column is introduced describing this mark.

In this table the prints showing five toe marks for each foot are taken first, and then those showing less numerous toes. Minor divisions are based, or the slenderness or stoutness of the toes as shown by the impressions, the weight of the heel, etc.

The geological horizon (*L. C.*=Lower Carboniferous and *C.* =Middle Carboniferous) and the date of publication are shown in columns, as well as the number of toes on each foot, as shown by the figures and descriptions of the several species.

And here I may remark that in the old method of representing those impressions by drawing and wood-cut there is wide scope for the exercise of the imagination, therefore, I may say that in their accurate representation there is more than usual advantage in the use of the camera, as the object is thus brought before us exactly as it appears, and we can apply to it the written description of the naturalist who has made observations upon it.

To the anatomist there may seem but small advantage in recording the aspect of the footmarks of an animal whose skeleton is unknown, but I will venture to say that fac-similes of footprints such as the camera preserves for us, will appeal to the unskilled observer more forcibly than a description of the anatomical details of the extinct reptile itself, as given in the usual descriptions of species.

There is also the hope that of the footprints cited in the following catalogue, some at least may eventually be referred to the creatures which made them, by the discovery of their skeletons. In the meantime their footprints recovered from the hardened mud flats of the Carboniferous age, may tell us some few incidents of their life-history.

CLASSIFICATION OF PALÆOZOIC BATRACHIAN FOOTPRINTS—UNITED STATES AND CANADA.

FIGURE REFERENCE.	GEOLOGICAL AGE.	GROUPS AND GENERIC AND SPECIFIC NAMES.	KIND OF IMPRESSION.	NUMBER OF TOES.		REMARKS.
				Hind Foot.	Fore Foot.	
III. 1,1*a*	....	Group 1. — *Notolacerta*, E. Butts, 1891.				
	C	Notolacerta Missouriensis, Butts, '91.....	Toes slender.	5	5	Track has a median groove.
I. 3 & 4	.....	Group 2. — *Hylopus*, J. W. Dawson, 1894.		5	5	
	LC	Hylopus ('94), Hardingi ('63), Dawson.....	Toes pointed	5	5 ?	

CLASSIFICATION OF PALÆOZOIC BATRACHIAN FOOTPRINTS—UNITED STATES AND CANADA.

FIGURE REFERENCE.	GEOLOGICAL AGE.	GROUPS AND GENERIC AND SPECIFIC NAMES.	KIND OF IMPRESSION.	NUMBER OF TOES.		REMARKS.
				Hind Foot.	Fore Foot.	
I. 3 & 4	LC	Hylopus, '94, Logani ('63), Dawson..... ..	Toes pointed	5	4 ?	Type defective.
III. 3 ..	C	Hylopus, caudifer ('63), Dawson.....	Irregular heavy.	5	5 ?	Interrupted median groove.
	C	Hylopus, minor.....	Heavy.....	5	5	Continuous median groove.
III. 4..	.....	Group 3.—*Pseudobradypus.* n. gen.				
	C	Sauropus unguifer ('78), Dawson.....	Heavy heel...	5	5	Long claws.
II. 3 & 4	.....	Group 4.—*Dromopus*, O. C. Marsh, 1894.				
	C	Dromopus agilis ('94), Marsh	Toes slender.	5	4	Shows phalanges.
		Group 5. — *Batrachichnus*, Woodworth, 1900				
	C	Batrachichnus plainvillensis ('00), I. B. Woodworth	Toes slender.	5	4	Median groove.
	C	Dromopus celer ('03), G. F. Matthew	Toes slender.	5	4	
I. 1 & 2	.....	Group 6. — *Thenaropus*, A. T. King, 1845.				
	C	(Sauropus) heterodactylis ('45), King.....	Heavy.....	5	4	
	C	Notolacerta Jacksonensis ('91), Butts.....	Heavy.....	5	4	
	C	Collettosaurus Indianensis ('76), E. T. Cox..	Heavy.....	5	4	
	LC	Sauropus primævus ('49) Lea.	Heavy.....	5	4	Interrupted median grove.
	C	Thenaropus (?) McNaughtoni '03, Matt..	Heavy.....	?	4	Only the fore (?) foot known.
II. 2...	.....	Group 7.—*Limnopus*, O. C. Marsh, 1894.				
	C	Limnopus vagans ('94), Marsh	Broad	5	4	
	C	Anthracopus Ellangowensis ('79), Leidy... ..	Broad	?	4	Only the forefoot

CLASSIFICATION OF PALÆOZOIC BATRACHIAN FOOTPRINTS—UNITED STATES AND CANADA.

FIGURE REFERENCE	GEOLOGICAL AGE.	GROUPS AND GENERIC AND SPECIFIC NAMES.	KIND OF IMPRESSION.	NUMBER OF TOES.		REMARKS.
				Hind Foot.	Fore Foot	
III. 6...	.....	Group 8. — *Baropus*, O. C. Marsh, 1894.				
	C	Baropus lentus ('94), Marsh.....	Long heel...	4	4	
	C	Baropus unguifer ('03), G. F. Matthew.....	Heavy heel..	4	4	Three toes have claws.
III. 5,5*a*.....		Group 9. — *Nanopus*, O. C. Marsh, 1894.				
	C	Nanopus caudatus ('94) Marsh.....	Heavy short.	4	3	Intermittent median groove.
	C	Sauropus Sydnensis ('63) Dawson.....	Heavy short.	4	3	Toes distinct from sole.
II. 2.....	.....	Group 10.—*Apatichnus*? Hitchcock.				
	C	Hylopus (?) trifidus, '94, Dawson.....	Toes slender.	3	?	No forefeet visible.
	C	H—— (?) ——, '94, Dawson.....	Toes slender.	?	3	Tracks of forefeet.
II. 1...	.....	Group 11. — *Ornithichnites*, A. T. King, 1845, (Hitchcock, 1832?)				
	C	Ornithichnites gallinuloides ('45), King	Slender.....	4 ?	?	The apparent fourth toe may be a long heel.
	C	O———— culbertsoni ('45) King.....	Slender.....	4 ?	?	
	C	Crucipes parva ('91), Butts.....	Slender.....	4 ?	?	Heavy median groove.

UNPLACED TRACKS.

C.—Cherotherium Reiteri, Wm. D. Moore, '73. C.—Sauropus, antiquior, Dawson. Dev. Thinopus antiquus, Marsh '96. C.—Allopus littoralis, Marsh. Notamphibia magna, E. Butts, 91-92.

Sphæropezium leptodactylum, A. T. King, '45. S. —— pachydactylum, A. T. King, '45. S. —— ovoidactylum, A. T. King, '45. S. —— thærodactylum, A. T. King, '45. According to Lyall these species of King are artifects, (fide O. P. Hay).

The above scheme is based upon the number of toe marks preserved in the impression made by the animal on the mud or sand. It will be seen that several authors have given the same generic name to tracks that are very diverse. I have quoted the generic names as given by the several authors, so that those who consider that the foot-

prints are not naturally placed in this scheme can suggest improvements.

The reference to the supposed print of the tail given in the margin will suggest a different arrangement to those who think this character has sufficient regularity and permanence to be of value as a primary means of classifying the impressions.

Taking the form of the footmark and the number of the prints left by the digits as a primary basis for classification, one may make the following remarks on the groups indicated.

Group 1 is distinguished by having five slender toes on each foot. *Notolacerta Missouriensis* of E. Butts ('91)—Pl. III., figs. 1 and 1a.—may be taken as the type of this group.

Dawson's name Hylopus has been retained for the 2nd Group—Pl. I., figs. 3 and 4. It contains two species described by Sir William Dawson from the Lower Carboniferous beds of Nova Scotia, as he asserts they have five toes on each foot. (?) The species are *Hylopus Hardingi* and *H. Logani*. *H. caudifer* is placed here as it is included in Hylopus by Sir William, but his figure gives only four toes and shows a good sized sole. This group needs further elaboration.

Group 3 is established to contain a remarkable type of footmark distinguished by the possession of long claws on both feet and by having a heavy heel mark, the paws, therefore, had great grasping power, such as was possessed by the sloths. A fuller description of this type will be given in a future communication to the society—Pl. III., fig. 4.

At Group 4, we pass from the tracks presenting impressions of five toes on both feet to the much larger division, in which, while the hind foot shows the print of five toes, the fore foot has only four. Here fall most of the footprints of the Palæozoic that have been described, and they are classified in this scheme according to the form and heaviness of the toe and heel marks.

Group 4 may be represented by Marsh's *Dromopus agilis*—Pl. II., figs. 3 and 3*a*—from the coal measures of Missouri, which possesses long slender toes. To it may be referred *Notolacerta missouriensis*, Butts.

Group 5, *Batrachichnus plainvillensis* of Woodworth, and a new species from the Joggins, *Dromopus celer*. The footprints of these two are very much alike, in form and size, but one shows a strong tail impression and the other none.

Under the name Thenaropus, King described several species of footprints which he afterward transferred to the genus Sphæropezium. He in the first instance described *Thenaropus heterodactylis* without a name in connection with the species of Sphæoropezium subsequently transferred. In the second communication (some months later, to the Am. Jour. Sci.), he requested that the name Thenaropus should be

retained for *T. heterodactylis.* As this request was made (1845-46) before the present rules of nomenclature were established, it seems to the author that this request should be respected; he has, therefore, adopted this name for the group. The next name in point of antiquity would be Sauropus used by Isaac Lea in 1855 for *S. primævus,* a species closely allied to King's type, but having an interrupted "tail" mark.

Group 6 has many representatives: *Thenaropus heterodactylis,* King may be taken as the type of this group—Pl. I., figs. 1 and 2—which contains also *Sauropus primævus,* King; *Collettosaurus Indianensis,* Cox, and *Notolacerta Jacksonensis,* Butts. A new species from the Joggins, *Thenaropus* (?) *McNaughtoni,* seems to fall here. In this group the toe marks are heavier and shorter than in the preceding one.

Group 7, also has five toes on the hind foot and four on the fore but the impressions left are broader and more massive than those of the preceding group. *Limnopus vagans,* Marsh, may be taken as the type of this group.—Pl. III., fig. 2.

Group 8, includes forms which have four toes on both fore and hind feet, and is well represented by Marsh's species *Baropus lentus*—Pl. III, fig. 6.—*B. unguifer,* a new species from Joggins, N.S., placed here provisionally, is perhaps the type of another genus.[1]

Group 9, is typified by a curious little footprint described by Marsh, *Nanopus caudatus,* from the coal measures of Kanz as Pl. III., figs. 5 and 5*a*.—*Sauropus Sydnensis,* Dawson, from Cape Breton, N.S., by the number of its toe prints would fall here, but it differs in important respects. It may be compared with King's *Sphæropezium thærodactylum,* which, however, has more numerous toes.

Group 10 is instituted for a part of the tracks described by Sir Wm. Dawson, under the name of Hylopus, doubtfully. They do not agree with his diagnosis of that genus, and they differ from the common ornithoid reptilian tracks of the Trias in the breadth of the palm, and the obscurity of both it and the toes—Pl. II., fig. 2. They are temporarily placed in a Triassic genus.

As representative of Group 11, the two footmarks described by King under the name of Ornithichnites, may be taken—Pl. II., fig. 1—with tracks resembling those of certain birds. *Crucipes parva* of E. Butts, may be included here notwithstanding the supposed heavy tail mark.

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[1] This will be described as genus Barillopus.

EXPLANATION OF PLATES.

Plate I.—*Thenaropus heterodactylis*, King. Fig. 1. Hind foot, showing impressions of the claws; reduced ½. Fig. 2. Forefoot; reduced ½. Fig. 3. *Hylopus Hardingi*, Dawson, Track; reduced ¼. Fig. 4. The same. Hind and forefoot. Natural size. *N.B.* The reduced figure shows only four toes on the forefoot.

Plate II.—Fig 1 *Ornithichnintes gallinuloides*, King. Also showing claw marks; reduced ½. Fig. 2. *Apatichnus trifidus*. Hind foot; magnified $^2/_1$. Fig. 3. *Dromopus agilis*, Marsh. Hind foot, showing phalanges. Fig. 3*a*. Fore foot; both natural size.

Plate III.—Fig. 1. *Notolacerta Missouriensis*, Butts. Hind foot. Fig. 1*a*. Forefoot; both natural size. Fig. 2. *Limnopus vagans*, Marsh. Fore and hind foot; natural size. Fig. 3. *Hylopus caudifer*, Dawson. Hind foot (?); natural size. Fig. 4. *Pseudobradypus unguifer*, Dawson. Series showing the hind feet, greatly reduced. Fig. 5. *Nanopus caudatus*, Marsh. Hind foot. 5*a* forefoot; both natural size. Fig. 6. *Baropus lentus*, Marsh. Series of footprints in pairs; the forefoot in advance; reduced $^1/_{12}$.

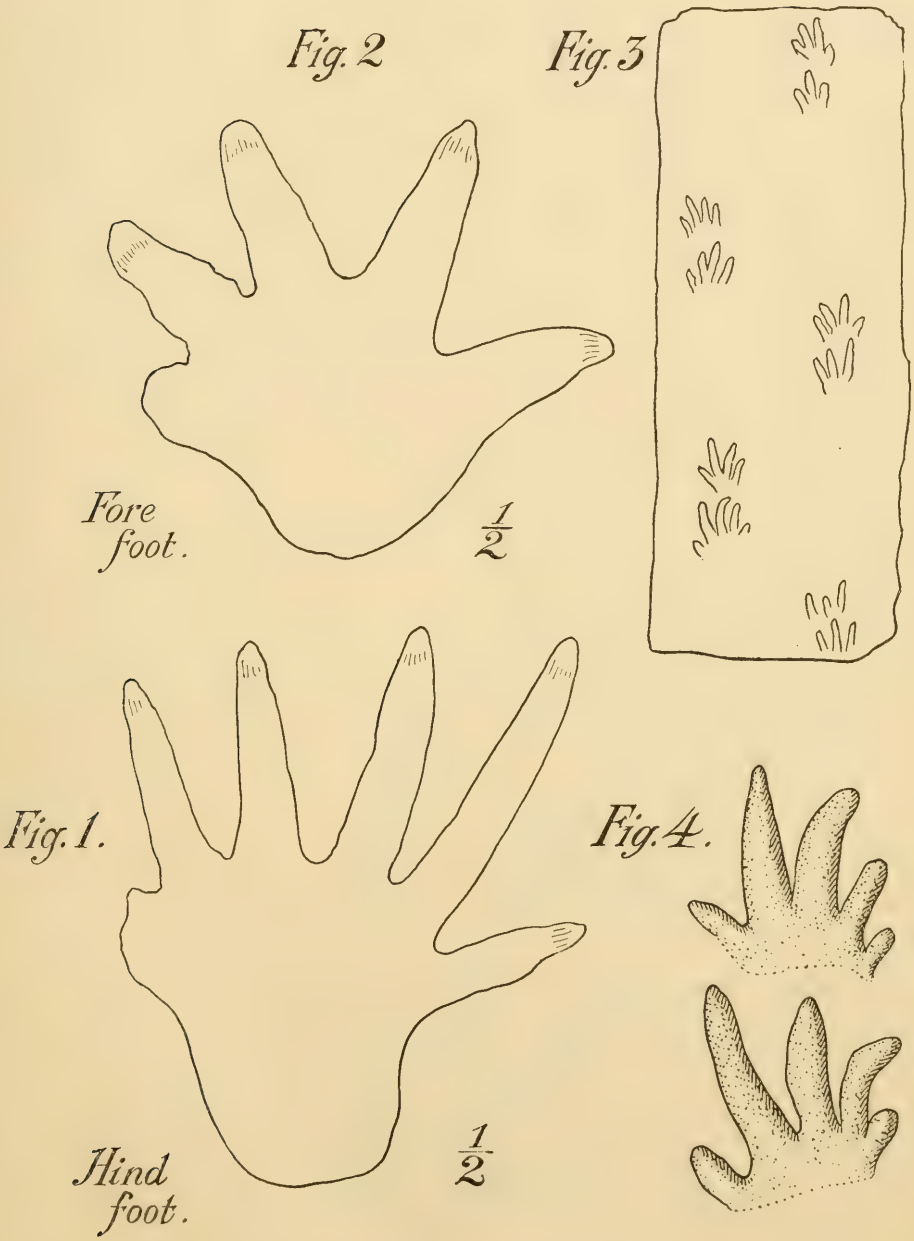
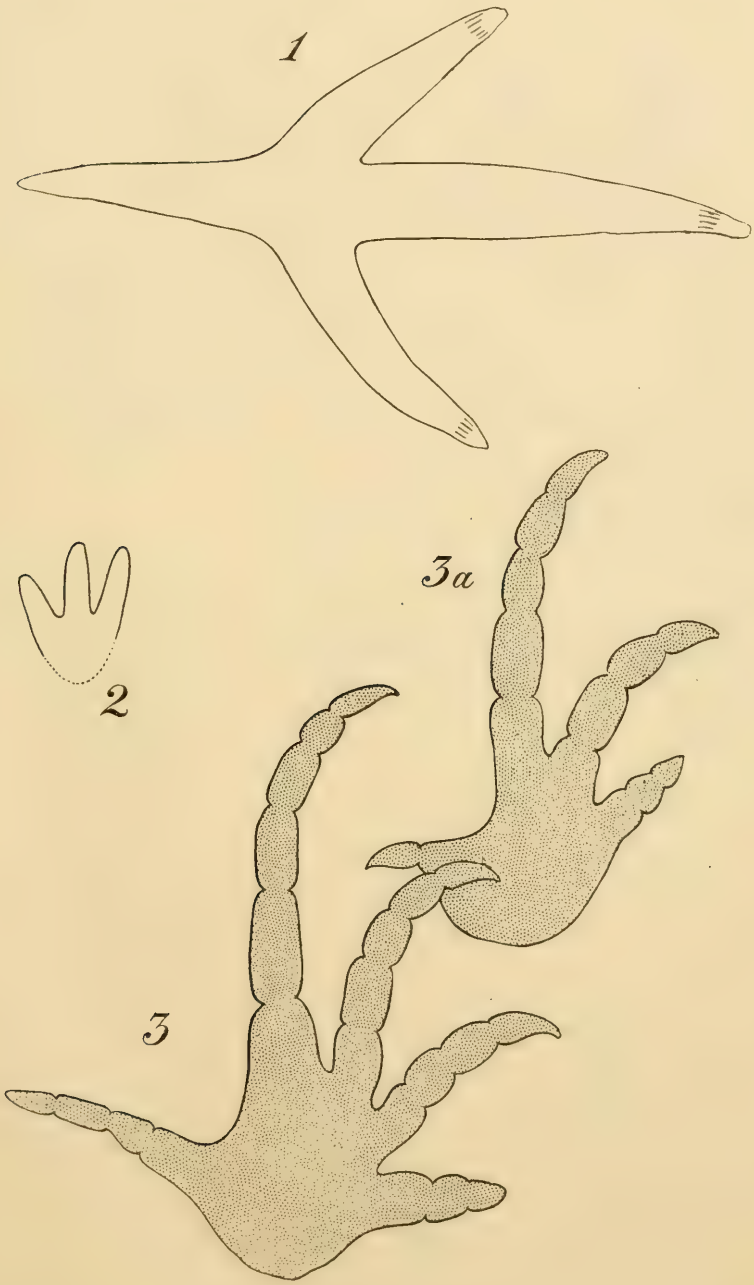


Fig. 2
Fig. 3
Fore foot.
1/2
Fig. 1.
Fig. 4.
Hind foot.
1/2


1
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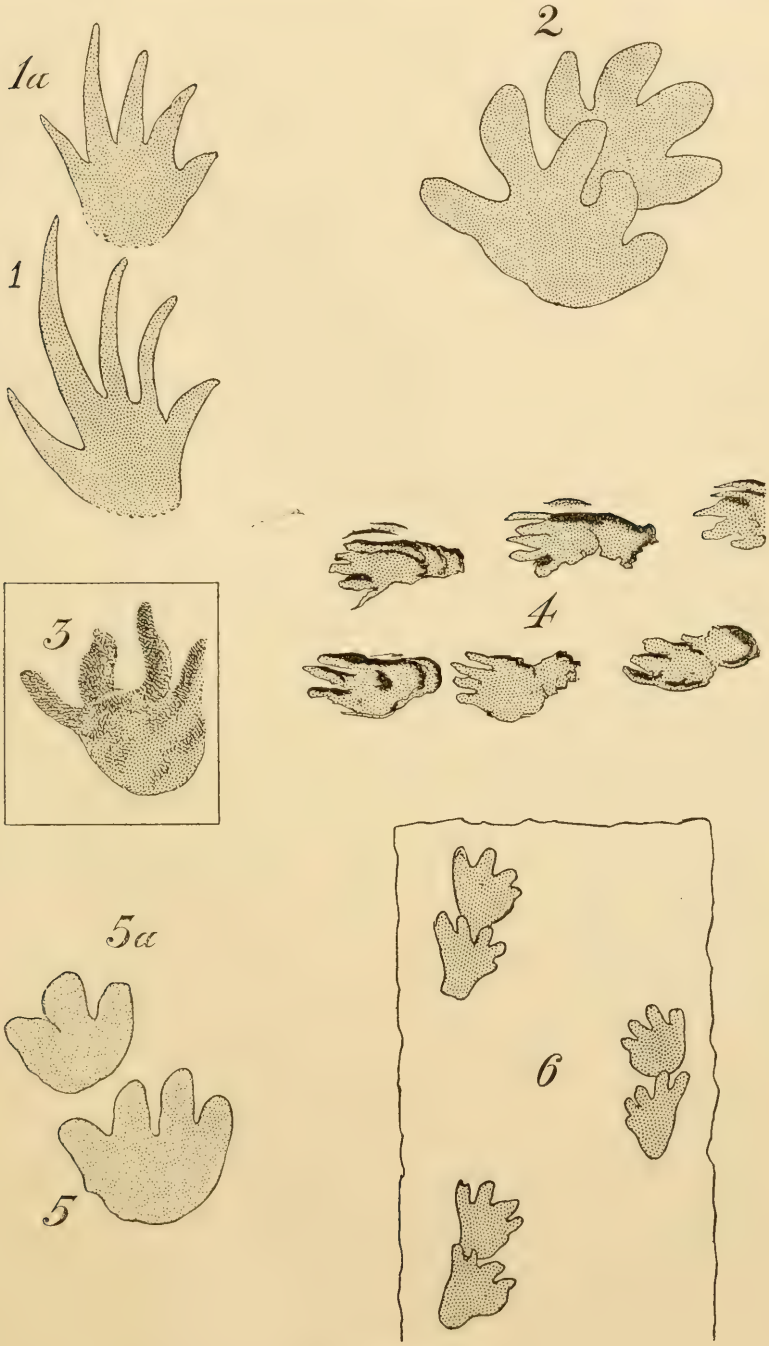
3


1a
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6

V.—*Mineral and Crown Land Grants in Nova Scotia.*

By EDWIN GILPIN, JR., M.A., D.C.L.

(Read May 19th, 1903.)

The recital of the grants made by the sovereigns of France, Spain and England to the early explorers of the eastern coasts of North America has an interest more sentimental than practical, as far as Nova Scotia is concerned. Here scarce a trace of these grants remains. The buffetings of this land back and forth left in 1713 a few acres cultivated by the Acadians, a few stockades, and a few fishing stations. The capture of Port Royal, afterwards called Annapolis Royal in 1710, marked the end of French rule in Nova Scotia.

After the treaty of Utrecht, the seigneurs who remained and took the oath of allegiance were to be allowed to keep the lands they were legally possessed of; but those who had left the province and returned, were entitled to hold land only from the sovereign of England on the payment of the customary quit rents. A few submitted, but they gradually disposed of their rights, and finally their lands were issued under Crown Land grants.

Although Nova Scotia was now finally ceded to Great Britain, and the New Englanders were determined to keep the French as far away as possible, little effort was made to effect permanent settlements. The best lands, those of the intervales of the Bay of Fundy, were in the hands of the Acadians, who yielded a grudged neutrality passing into active unfriendliness whenever intercourse was sought by the English.

The Government was administered from Annapolis until a capital was established at Halifax in 1749. The land records of the Annapolis administration are contained in a small book and present few points of interest. Grants were made for house lots within the banlieu of the garrison, and for fishing stands at Canso, Pubnico, etc. In 1732 a grant was made to Major Cope and others of lands at Joggins, Cumberland County, with permission to dig coal at a royalty of 1s. 6d. per chaldron. It is reported that a few cargoes were dug and shipped to Boston.

In 1736, we find that the council practically granted to themselves and the principal settlers two lots of 50,000 acres each, with permission to dig all minerals and coals, one lot lying west of Chignecto Basin, and the other on the east side of the Avon river. These grants were escheated in 1760.

The Annapolis records show that attempts were made to exact rents from the Acadians.

The difficulty experienced in collecting these rents, which were regarded by the Government as a mark of submission, doubtless had its influence when the question of the expulsion of the Acadians was debated.

The settlement of the country was threatened by war with France in 1744, and upon the fall of Louisburg in 1745, the English Government determined that the security of their colonies and the reduction of the French power in Canada, could be effected only by having a stronghold near the mouth of the St. Lawrence.

On the conclusion of the war with France in 1748, the provincial authorities took up the question of colonization. Reports were submitted by Goreham and by Morris (the latter afterwards Chief Surveyor of Crown Lands) favouring settlements by New Englanders, and pointing out suitable localities. The home authorities, however, decided to make a headquarters settlement at Halifax, to send out English colonists, and to make London, not Boston, the basis of the province. This was done the following year.

The French Acadians refusing to take the oath of allegiance were expelled in 1755. War with France in 1754, followed in 1756 by the Seven Years War retarded the growth of the colony, and hindered the scheme of settling the Acadian lands in 1756.

The lands of the Acadians were the only cultivated districts after the occupation of Nova Scotia by civilization since 1605. The extent of the settlement was officially stated by the Government of Nova Scotia to amount to 100,000 acres of intervale and dyked land, and to an equal amount of cleared upland. Presumably, from the information available, the total amount of cleared land did not exceed 125,000 acres, as the Acadians do not appear to have been numerous enough to have been forced to the severe labour of clearing the forests.

Many of the French after the lapse of years returned and received grants at Clare, Pubnico and other parts of the province.

It will be seen that the French occupation of Nova Scotia did not leave any question of mineral titles.

The settlement of Halifax was followed in 1753 by the planting of a German colony at Lunenburg.

In October, 1758, a proclamation was made, throwing open the abandoned lands of the Acadians. Numerous enquiries were addressed to the provincial agents in New England towns, which led to a second proclamation giving fuller details of the conditions of the settlement. As before, in 1748, the English Government did not approve of this scheme of colonization, as it forestalled arrangements contemplated for sending out settlers from England. The English, however, engaged in a fierce

war with France, had little time to study the details of colonizing Nova Scotia.

On May 29th, 1759, grants were passed of the townships of Horton and Cornwallis, followed by grants of similar townships at Granville, Cobequid, Onslow and Annapolis. This tide of immigration from 1759 to 1761 was from the New England colonies.

It was followed by one of Irish and Scottish nationality from 1761 to 1763, and by Loyalists during and after the war with the United States.

So general had been the tide of settlement that in 1763 there were nineteen townships, containing 1,861,000 acres of land, and settled by 1797 families. In 1767 there were thirty townships with a population of 13,374.

In 1763, Cape Breton was ceded to England, and passed under the administration of the Governor of Nova Scotia. It was erected into a separate province in 1784, and re-annexed to Nova Scotia in 1820. Its mineral reserves will form a separate note.

The accompanying table shows the sequence of the mineral reservations. Up to the year 1763 coal was not reserved. Afterwards it was reserved, except in a few cases between the years 1763 and 1767. From the year 1808 iron ore was reserved. It follows, therefore, that in many of the older townships grants issued between 1759 and 1785 the Crown does not profit by the mining of this ore. This is notably the case in the grants of Guysboro, Londonderry, Nictaux and Clementsport, and in numerous large blocks of land granted to the Loyalists, and early Scotch settlers in Antigonish, Pictou and Colchester counties.

The grant of the township of Annapolis may be taken as an example of the contradictory and confusing manner in which the mineral grants were handled. On August 4th, 1759, the township was set off to contain 100,000 acres, and grants issued thereunder to 112 of the 200 shares. On October 6th of the same year, 45 more shares were conveyed. On the 12th of the same month 35 more shares were allotted. In these, there was no reservation of minerals. However, on October 30th, 1765, these grants were surrendered and new ones issued, containing reservations of gold, silver, coals, etc. In addition in many of the old grants some of the lots were not occupied, or were abandoned. These lots were frequently applied for under later grants, thereby introducing much confusion about the mineral reservations.

The reservations of 1808 continued in force until the mineral grants were taken out of the hands of the Provincial Government.

In the year 1825 numerous applications for coal leases were considered by the English Treasury. As it appeared that in the year 1788, His Majesty's Government had recommended that a grant of the minerals

in Nova Scotia be issued to the Duke of York, and that on the report of the Attorney-General the form of the grant had been practically decided in 1792, the grant was concurred in and formally issued on August 25th, 1826.

By this grant the King gave to His Royal Highness Frederick Duke of York and Albany, all the mines of gold and silver, coal, ironstone, limestone, slate-stone, slate-rock, tin, copper, lead and all other mines and ores and all beds and seams of gold, silver, coal, ironstone, limestone slate-stone, slate-rock, tin, clay, copper, lead and ores of every description belonging to His Majesty in the province of Nova Scotia, except such mines as by virtue of any grant or lease given by the sovereign or any governor of the province, had been opened, and were at the date of the grant then in course of working.

This sweeping grant was transferred to the General Mining Association of London, who promptly opened extensive coal mines in Cape Breton, Pictou and Cumberland counties, after buying out several parties mining on a small scale under leases from the Provincial Government.

Some years after the passage of the grant it was pointed out that it was virtually a perfecting of the original grant, proposed in 1788, Cape Breton being then a province separate from Nova Scotia, when it was reannexed to Nova Scotia in 1820, six years before the grant issued. On the principle of interpretation of grants in favour of the Crown, the contention was considered to be well founded that the minerals in Cape Breton did not pass with the grant. A subsequent declaration extended the grant so that it would include the Cape Breton minerals.

The Governors of Nova Scotia were probably advised confidentially of this proposed grant of 1788, for no attempt appears to have been made to open any coal mines on a practical scale. In 1784 the leasing and even the official working of coal appears to have been discouraged by an order of the Privy Council.

At first this cession of the mineral rights of the province was regarded with approbation as large sums were expended in opening and working mines. Gradually public opinion changed and the grant was denounced as improvident and oppressive. After repeated attempts to induce the English Government to cancel the grant, an arrangement was arrived at in 1858, whereby the General Mining Association retained large tracts of coal in the counties of Cape Breton, Pictou and Cumberland, paying a royalty on the sales; and their other mineral rights reverted to the Government of Nova Scotia. The province, therefore, resumed control over all the minerals in its ungranted lands, and in the lands granted between August 25th, 1826, and the date of the settlement,

and over all the minerals reserved in lands granted prior to the Duke of York's grant.

Upon the completion of the surrender Chapter 2 of the Acts of 1858 came into force. It was intended to give certain mineral rights to those receiving grants during the period of the Duke of York's lease, and to define more clearly the extent of the reservations made in general terms in grants passed prior to 1826. The Act did not apply to any minerals not vested in the Crown by the surrender, or to any expressly reserved, or granted, but to reservations in general terms or otherwise ambiguous.

By virtue of the Act all grants prior to 1858, subject to the above reservation, were to be construed to read, as if the Crown reserved gold, silver, copper, lead, tin, iron, coal and precious stones, and the grantees received all other minerals.

The curious sight was thus presented of the Government of Nova Scotia, fighting for years to remove the monopoly of the General Mining Association, and, when successful, immediately inundating the people with mineral rights. As a matter of fact, the grantees wanted only the minerals useful for domestic purposes, such as clay, slate, stone, limestone, etc., and as a matter of business all other minerals known or to be discovered should have been retained for the future revenue of the province.

This reservation continued in force in all grants until 1892, when the Crown reserved all minerals except limestone, gypsum and building material.

At the present day the procury of title to minerals, the property of the owner of the land is attended with much difficulty. Loose occupation, imperfect descriptions, non-division of property, squatters' titles, etc., confront those charged with the task of searching titles for would-be purchasers. It will be necessary for the Government to devise legislation which, preserving equitably whatever mineral rights the owner of the soil may be entitled to, will give to investors the security of title enjoyed by those acquiring leases of Crown minerals.

Cape Breton.

In the fall of 1763 after the inclusion of the island of Cape Breton in the Government of Nova Scotia, the project of its colonization was taken up by the Lords of Trade. It was then uninhabited except by a few traders and fishermen at Louisburg, Sydney and St. Peters, and by small scattered fishing communities planted by the French.

It was decided that first information should be submitted as to its resources in the way of lumber, arable land and coal. Governor Parr

was accordingly instructed to procure such a report. Captain Samuel Holland was ordered to make the necessary examination and report. The report was submitted in the spring of 1767.

In the meantime, rumours of the fertility and value of Cape Breton were widely circulated, no doubt caused by the delay in opening the island to settlers. We find accordingly, that in 1764, the Duke of Richmond applied for a grant of the whole island. In the same patriotic strain Brigadier-General Howe and his associates wanted a grant of the coal, and so on with Sir Samuel Fluyders and others.

Up to 1767 it appears that a small number of licenses of occupation had been granted. Although continually, especially in 1769, numerous applications were made for grants, the Lords of Trade refused to entertain them.

In 1770, as fishermen and smugglers were constantly stealing coal from the outcrops of the seams on the shore, a proclamation was issued forbidding any one to dig or remove coal. The policy of not encouraging settlement in Cape Breton continued up to the year 1784. I am not aware of the reason for this continued delay in the opening up of this island. As mentioned already in these notes, Nova Scotia proper had since 1759 been laid out into townships and had received a steady inflow of settlers from New England, followed by Loyalists and others. It may have been that the application of the Duke of Richmond for the land and minerals of the island suggested its reservation from settlement, with a view to its being ultimately handed over to a member of the Royal family. As already mentioned, this plan of disposal of the island was entertained in 1788, and finally carried into effect in 1826, as far as the mineral rights were available.

It is deeply to be regretted that the Government of Great Britain had not at first adopted a system of colonization; for Cape Breton lost half a century, and its settlement was practically deferred until the dawn of the last century.

In 1784, Cape Breton island was erected into a separate province and Major DesBarres, an officer of high attainments and extensive acquaintance with Nova Scotia, was appointed governor. The policy of exclusion had been reversed on the appointment of Lord Sydney as Secretary of State for the Colonies, and the Governor-General of the Maritime provinces was directed to see that in future land grants reservations were made of all gold, silver, copper, lead and coals.

The first grant was issued May 17, 1786, to H. W. Perry; of a lot of land at Sydney, the new capital of the island, named after Lord Sydney,

A number of grants were made to Loyalists, who, however, in many cases did not become permanent settlers. As an example the case of the

Mira grant may be cited. This was issued June 26th, 1787, to Jotham White and one hundred Loyalists from New York State, and embraced 100,000 acres on the shores of Mira river. Very few of the grantees went into possession, and the grant was escheated. The Transactions of the Nova Scotia Institute of Science contain a note by the writer on the history of this grant which was made the subject of several legislative enactments, involving the title of the iron ore beds recently discovered on it.

In 1790, the Secretary of State for the Colonies ordered that no further grants be passed on. The issue of grants already passed on continued up to March 17th, 1893, when 179 grants had issued. These grants contained the reservations prescribed by the Governor-General, referred to above.

The conversion of the small holdings of the Scottish Highland estates into grazing grounds, led to an extensive and long continued emigration. This flowed at first to Canada, but in 1802, the pioneer ship of the direct Cape Breton immigration arrived at Sydney. The tide reached its height in 1817, and the last ship arrived in 1828.

With these settlers came many soldiers, disbanded from Scottish and English regiments, all settling in Cape Breton and Eastern Nova Scotia.

From 1790 to 1811, it would appear that settlers received warrants of survey, Crown licenses, etc., and at the latter date Crown leases at will were issued. For a number of years past and up to 1826, coal was intermittently mined under short licenses.

Upon the re-annexation of Cape Breton to Nova Scotia in 1820, steps were taken to put the Crown lands and grants into better shape, and the Surveyor-General was directed to lay off lands in lots of 100 and 200 acres under tickets of location, to be replaced later on by grants if the applicants proved to be *bona fide* settlers.

At this date it would appear that:—

229,220 acres were occupied in fee simple.
98,600 acres were occupied under Crown leases.
15,000 acres were taken up under tickets of location.
342,000 acres were held under warrants of survey, petitions and by squatters.

After 1820 the Crown lands were issued under the regulations and reservations in force in Nova Scotia.

The following abstract of reservations may prove of interest:—

The first grant was issued May 17, 1786, to H. W. Perry, reserving all mines of gold, silver, lead, copper and coals, (Book A, page 9). This reservation continued down to and including the grant of September 10th, 1804 (Book C.).

No grants appear to have been issued in 1805 and 1809. The grants issued in other years down to and including the grant of March 30th, 1810, to Wm. White *et al.*, situated at Eastern Margaree in the county of Inverness, refer to "conditions as in all (or other) grants." (See Book C.)

From this date onwards there were many Crown leases. No grants however, appear to have been issued until February 6th, 1818, when one was recorded of land at Kinloch, between Broad Cove and Mabou, in the county of Inverness, to Alexander McDonald (Book D, page 346). The reservations in this grant were "all mines of gold, silver, copper, lead and coals, gypsum, slate and other quarries."

Book E is taken up with the record of Crown land leases, tickets of occupation, location, etc.

This reservation continued in grants found in Book F down to and including a grant, dated June 14th, 1820, to Christie McNeil. (Book F, page 190.)

The re-annexation of Cape Breton to Nova Scotia now took place, but the Cape Breton records show the issue of leases and grants applied for and passed on prior to the date of the proclamation, extinguishing the Government of Cape Breton. (October 9th, 1820.)

The final issue of grants took place on December 28th, 1820. The first being to Clement Hubert, of land at Arichat Harbor, Isle Madame, in which the reservations were only gold, silver, copper, lead and coals. (Book F, page 198.)

Questions having arisen as to the titles of the various tenancies at will, leases, etc., an Act was passed by the Legislature of Nova Scotia, Chapter 11, Acts of 1851, confirming all the laws, statutes, ordinances, customs and usages in force in Cape Breton, between 1784 and 1820.

Since this date the terms and conditions of Crown land grants in Cape Breton are the same as in Nova Scotia proper.

In 1854 to make the land titles of Cape Breton as issued prior to 1820, agree with those of Nova Scotia proper, chapter 43, enacted for the settlement of titles to land, that all persons in Cape Breton in undisputed possession of lands, who had applied for a grant, should receive one free of further charge.

This legislation of course did not interfere with the regular grants already issued or with the reservations therein, but allowed all holding leases, tickets of survey or location, etc., to get a deed from the Crown, and a formal registry thereof. The Act conferred no mineral privileges on those holding land under such titles, as they originally conferred no mineral rights. Consequently in 1826 the Duke of York's grant took all the minerals under the Crown leases, tickets of location, etc.

The legislation of 1858, however, already referred to, gave these grantees important mineral rights, equally with those receiving Crown Land grants between 1826 and 1858.

These notes may be closed by a reference to later legislation affecting mineral rights.

By Chapter 3 of the Acts of 1899, the Legislature gave the Governor in-Council power to lease under such conditions as appeared proper, for a term of years, for lumbering purposes, Crown lands not suitable for farming purposes.

Under this legislation a lease was made of all the ungranted lands in the counties of Inverness and Victoria to a company undertaking to put on foot extensive lumbering operations.

In the lease the reservations of Chapter 16, Acts of 1892, already referred to, as reserving all mines and minerals "excepting limestone, plaster and building materials" are amended as follows:—"Reserving all mines and minerals, mineral paints and oils, gypsum or plaster."

As regards the lessees it is quite reasonable that they should agree to divest themselves of the gypsum and incidentally of the limestone and building material as they received a most valuable franchise. The lease of this tract estimated to contain 500,000 acres of land, stipulates that the Crown can issue grants to *bona fide* settlers over any portion of it. So that in any such grants in fee the reservations of 1892 quoted above would apply. Presumably, however, the Governor-in-Council could lease for working, as Crown minerals, any gypsum, limestone or building material, if not included in any fee simple grant applied for prior to the issue of such lease for working.

BIOLOGICAL LIBRARY

RESERVATIONS FROM 1731–1892, A.D.

GOLD, SILVER, PRECIOUS STONES, LAPIS LAZULI.	GOLD, SILVER, PRECIOUS STONES, LAPIS LAZULI, LEAD, COPPER AND COALS.	GOLD, SILVER AND COALS.	GOLD, SILVER, LEAD, COPPER AND COALS.
Book 1.—Pages 6, 54, and 57, no reservation, but privilege of digging coal (see reference to grants, Government of Annapolis) 1731–1759, A.D.			
Book 2.—Reservation as above, save pages 11, 53, 71, 117, 135, 178, 210, 222.	1759-1760, A.D.		
(*No reservations.*)			
3. Above reservations all through	1759-1763, A.D.		
4. Same reservations as above except pages 114, 116 and 117, with no definite reservations.	1761-1763.		
Book 5.—Pages 1–150; 169–175; 214–220; 239, 250–255, 266–276, 304, 383, 389.	**Book 5.**—Pages 151-168; 171, 177-211; 223-238; 242-247; 258-263; 280-301; 307-321; 327-338; 345-380; 394-396; 403-410.	**Book 5.**—Pages 324, 341, 343 386, 392, 400.	1763-1765, A.D.
Book 6.—Pages 1–140; 152–166; 715.	**Book 6.**—143-150; 168-300; 306-313; 325-327; 331-348; 353-369; 373, 375; 381-399; 429; 436-442; 445-450; 467-471; 493-502; 506-517; 526-530; 533-535; 538-574; 582-592; 701.	**Book 6.**—Pages 304, 323, 329, 350, 371, 377, 401-427; 431-435; 444; 454-466; 473 490; 504, 519, 524, 531, 537, 580, 593-603; 664, 666, 676, 693-697; 766, 768.	**Book 6.** — 605-661 667-675; 678-692, 699; 703-714; 718-763; 779 (end). (1763-1768, A.D.
Book 7.—Page 15 113 128 136 145+coals 147 152 197 222 227	**Book 7.**—Pages 1-3 41, 55, 59, 62 67, 77, 82-86 101, 107 138-140 149 154-158-161 164-166 182-184 190-207 228	**Book 7.**—Pages 16-39; 43 51 61, 65, 80 88-98; 104-109 115-125; 131-134 143, 162; 175-179 210, 220, 231-233	**Book 7.** — 185-188; 191-196, 198-206; 208, 211-219; 223-225, 230; 234-244. (end). (1765-1767, A.D.)

RESERVATIONS FROM 1731–1892, A.D.

SOLD, SILVER, PRECIOUS STONES, LAPIS LAZULI.	GOLD, SILVER, PRECIOUS STONES, LAPIS LAZULI, LEAD, COPPER AND COALS.	GOLD, SILVER AND COALS.	GOLD, SILVER, LEAD, COPPER AND COALS.
Book 8.—	**Book 8.**—	**Book 8.**—Pages 3, 7-12; 16-20, 26-30; 38-55, 59-71; 78, 84-90, 104-106, 127, 135, 145; 190-205, 234-259.	**Book 8.**—Pages 1, 4, 5, 14, 22, 32-34, 57, 73-76, 80-82. 94-101, 109-122, 129-133, 137-141; 147-187: 207-231, 237-257, 262, 268, (end). (1767-1771, A.D.)
Book 9.—Page 20.	**Book 9**—Pages 37. 57, 62, 77, 150-152, 189, 314.	**Book 9.**—Pages 14, 55, 61, 65, 70, 73, 84. 85, 91-103, 107, 114-120; 124-135, 142-148; 169-171, 196.	**Book 9.**—Pages 1-12, 16-18, 21-35, 38-54, 58-60, 71, 75, 79-82, 87 (minus copper), 89, 105, 109-113, 122, 137-140, 154-167, 174-187, 193, 198-311, 317-323 (end). (1767-1772, A.D.)
Book 10.—Pages 40, 63	**Book 10.**—Pages 87, 116, 127, 146, 150, 188, 229, 240.	**Book 10.**—Pages 82, 157, 159, 197, 220, 288, 354. (1771-1778, A.D.)	**Book 10.**—Pages 4-38, 42-59, 66-80, 84, 89-112, 118-122, 128-144, 153-155, 162-185; 190-194, 200-216: 222-226, 231-238, 244-283; 291-352; 356-364, (end).
Book 11.—Pages 2, 27, 262, 290, 342.	**Book 11.**—Pages 43, 89, 94, 103, 143, 204, 206.	**Book 11.**—Pages 110, 151, 243, 260, 288, 293, 295. (1772-1775 A.D.)	**Book 11.**—Pages 3-23; 29-41; 45-85, 92-98, 108, 114-138, 147, 154-200; 211-241, 245-257, 265-285; 297-339, 345-353 (end).
Book 12.—Pages 183. 241 (plus coals).	**Book 12.**—Pages 27, 39.	**Book 12.**—Pages 60, 62. (1775-1783, A.D.)	**Book 12.**—Pages 1-26; 29-37, 41-57, 64-133, 136 (minus gold), 138-179; 184-239.
Book 13.—Page 50.	**Book 13.**—Page 48.	**Book 13.**— (1783-1785, A.D.)	**Book 13.**—Pages 1-41; 52-101, 103 (minus copper), 104-258 (end). **Books 14-21**, above reservations all through. (Bk. 14. Bk. 21.) (1784. 1807, A.D.)

RESERVATIONS FROM 1731–1892, A.D.

GOLD, SILVER AND COALS AND OTHER MINES AND MINERALS.	GOLD, SILVER, COAL, IRON-STONE, LIMESTONE, SLATE STONE, SLATE ROCK, TIN, COPPER, LEAD AND ALL OTHER MINES, MINERALS AND ORES.	GOLD, SILVER, COAL, IRON, TIN, COPPER, LEAD, PRECIOUS STONES.
Books A to P, and part of Book R. (Book A—Bk. P. 1808-1833, A.D.)	**Books Q—Z**, and part of Book R. **Books 12-25** (pages 1-50 in Book 25.) (Book Q—Book Z, 1833-1847, A.D.) (Book 12—Book 25) new series. (1839-1858, A.D.)	**Books 25—64**, (pages 51-end in Book 251). (Book 25. Book 64.) 1858-1892, A.D.

NOTE.—No minerals granted Aug. 25, 1826 to Aug. 25, 1858. See Duke of York's grant.

VI.—*Francis Bain, Geologist.*

By LAWRENCE W. WATSON, M.A.

(Communicated by R. W. Ells, LL.D., and read May 19, 1903.)

It were an injustice to merit and to science were the memory of Francis Bain allowed to remain only with those who shared his affection, with the larger company of those who enjoyed the charm of his companionship, or even with the many who are proud to claim fellow-citizenship with him in his native province of Prince Edward Island.

Although he was possessed of rare natural talent and richly endowed with intellectual gifts, it is his development of this inheritance under many adverse circumstances which constitutes a strong claim upon public recognition. Hampered by the exacting demands of a farmer's life, companionless in his pursuits from rural isolation, with little more than an elementary education, lacking the stimulus which learned societies so generally afford, and without the aid of literature which his comparatively limited means debarred him from acquiring, he was up and doing before the little world around him was aware of his worth.

His geological attainments are all the more admirable because of the limited extent of territory which could come under his observation, and the unvarying character of the few constituent formations, for the most part singularly, but characteristically, barren of aids to geological study. To this narrow scope for observation and the absence of local scientific institutions which could take cognizance of his investigations and give them publicity, must be attributed in large part the comparative obscurity of the name of Francis Bain in the annals of Canadian geology. Unquestionably, had he lived upon the mainland, with its wider field of work and its auxiliaries to scientific study, there would have been little need to thus introduce him to the scientific world. While Mr. Bain may appear, in comparison with other geologists, to have accomplished but little, the circumstances which limited possibilities in his case, must be borne in mind. It must rather be conceded that he accomplished almost everything possible for him in the field of local geology and much in other departments of natural science.

Daniel Bain, architect, and grandfather of Francis, was born in Thurso, Caithness county, Scotland, in 1763. At the age of thirty-five he married Janet, daughter of Francis Watters of the same place. To these were born seven children, of whom, William, the third son, was educated in the schools of the capital city, finally attending the School of Arts, where he distinguished himself in mathematics. Having learned the trade of a stonemason, he undertook the contract for the

construction of some public buildings; but, meeting with financial loss, he determined to emigrate to Montreal. The vessel in which he crossed the Atlantic called at Pictou, Nova Scotia, for supplies. Hearing here that cholera was epidemic in Montreal, Bain abandoned his intention of proceeding thither and determined to remain in Pictou, working at his trade. Here he made the acquaintance of Mr. J. William Dawson, afterwards Sir William, and after the expiration of two years he sent for his parents, removing with them to Charlottetown, Prince Edward Island. Later he bought a farm at Caithness Cove, West River, opposite Charlottetown on the west, and here lived with his father and mother except when employed in the city as stone cutter, mason and builder, in which last capacity, associated with a Mr. Watts, he built the provincial government building.

In 1839 he married Ellen, youngest daughter of William Dockendorff, owner of the farm adjoining his own. Of this marriage were born four children, William, [1840], Francis, [February 25th, 1842], Jane, [1843], and Jacob [1845], of whom the eldest died at the age of twenty-two years, and the remaining brother and sister survive the subject of this sketch.

Daniel Bain, died in 1851, three years after the demise of his wife, and in the following year William died, leaving his widow to manage the farm until her sons were able to share her responsibilities.

The children all attended first a school taught in her own house by Mrs. Ross, wife of the Baptist minister of North River, and afterwards the school established in the district by the provincial government. At the age of thirteen or fourteen years, Francis attended, for one winter term, Dr. Leeming's class in the Infants' School-room in Charlottetown. Four or five years later he attended the Central Academy for one term, living in Charlottetown while engaged in his studies; but at the expiration of this time, the illness of his elder brother forced him to return to his work on the farm. By the death of the latter in 1862, and the marriage of his sister, (the younger brother, Jacob, having meanwhile removed to a home of his own), Francis was left alone to manage the affairs of the farm. In 1876 he married Caroline, daughter of David Clark, farmer, of Cavendish, to whom were born six sons and three daughters.

As a boy Francis Bain was of a retiring disposition and fond of reading and study. After he had been forced to abandon his attendance at school he continued his study of the classics and mathematics, to which, in later years, he added the study of French and German. He early developed a liking for natural history, and every opportunity found him at his favorite pastime of collecting entomological, concholo-

gical, botanical and geological specimens. He had artistic tastes of no mean order, as attested by his accurate drawings of plants and insects.

From time to time he read papers or delivered lectures to the Literary and Scientific Institute in Charlottetown, and also to the Natural History Society of Prince Edward Island, of which he was an interested promoter, and afterwards an enthusiastic supporter until his death. He contributed articles to various scientific publications, to religious papers and very frequently to the local press. Fond of poetry from his youth and of committing it to memory, he naturally coloured his writings with a beauty of expression as remarkable as it is pleasing.

In 1890, he published "The Natural History of Prince Edward Island," a small volume of one hundred and twenty-three pages, devoted to the geology, botany and zoology of the province. This little work was authorized for the use of schools on the Island. This publication was followed in the next year by his "Birds of Prince Edward Island" (eighty-seven pages), representing the fruit of his life-long study of birds, native and visitant. In July of the same year the Natural History Society published a "List of Prince Edward Island Plants," the joint production of Mr. Bain and Mr. John MacSwain. Mr. Bain supplemented this list in 1892 by additions, comprising thirty flowering plants, three ferns and sixty-five algæ, and again in 1894, by a list of fifteen mosses, three liverworts, fifteen lichens and twenty fungi.

In the spring of 1892, Mr. Bain delivered a course of lectures upon Botany, under the auspices of the university extension authorities of Mount Allison College, Sackville, New Brunswick. Later in the year, when borings were undertaken in connection with the proposed tunnel under the Straits of Northumberland, between Capes Traverse and Tormentine, Mr. Bain was appointed geologist by the Dominion Government for this work, in which capacity he acted for four months ending October 12th.

In June, 1894, he injured his left shoulder while lifting a heavy weight, and in consequence, lost the use of his left arm. Shortly afterwards he suffered a slight stroke of paralysis. During the summer he lectured in Charlottetown upon Geology for the Summer School of Science. After a rest of a few weeks he visited Boston in hopes of regaining his accustomed health, but within three weeks after his return he was again stricken with paralysis, from which he never recovered. A third attack ensued which ended fatally on the 23rd of November, 1894. Two days later the mortal remains of Francis Bain were laid to rest in the Baptist cemetery in Wiltshire near his old home.

His was an attractive personality. Quiet, unassuming, kindly, ever ready to help when his assistance was desired, a pleasing conversationalist, a warm friend, a fond husband and father. His knowledge of

chemistry and his industry made him a successful farmer, whose advice was much sought after, and whose opinions carried indisputable weight. An active member of the Baptist church, he gave evidence of strong religious convictions in an unobtrusively consistent, upright life.

The work of Francis Bain is deserving of recognition, not so much for its extent as because of the perseverance with which he prosecuted his studies, with little of the encouragement which others, less gifted by nature, have profited by. He seemed to have reached the stage which demands expansion where expansion was impossible, or of difficult attainment. Recognizing with Sir William Dawson, Dr. Ells and others the true position in the Permo-Carboniferous of the St. Peter's and Governor's Island rocks, as well as those of Gallas Point and the western shore of Prince Edward Island, and conceding the otherwise almost universal occurrence of the Permian in the province, he, however, associated a much more extensive and more distinctly defined existence of the Trias than other geologists seemed willing to grant. While, possibly, he was somewhat overinfluenced by enthusiasm in favour of his convictions, and, at times, hasty in his conclusions, his opinions must be regarded with respect as the outcome of conscientious study and observation. And if his isolation and the circumstances of his surroundings debar him from a rank among the foremost of Canadian scientists, he must, nevertheless, be accorded an honourable place as the first, and so far the greatest, naturalist which his native province has produced. His name is associated with *Tylodendron Baini,* Dawson, a species discovered by him and so-named by Sir William Dawson in 1890.

The Natural History and Antiquarian Society of Prince Edward Island are about to place in Queen Square gardens in Charlottetown, as a tribute to his memory, a large errant glacial granite boulder, bearing a bronze tablet, inscribed:—

FRANCIS BAIN, GEOLOGIST.
1842-1894.
Erected by the Natural History and Antiquarian Society of Prince Edward Island, 1903.

PAPERS BY FRANCIS BAIN.

Among the papers contributed by Mr. Bain to scientific journals may be mentioned as probably the first in point of time, an article, published in the *Canadian Naturalist,* Montreal, January, 1881, vol. IX., 2nd series, on "Fossils from the Red sandstone series of Prince Edward Island." This paper contains, in addition to the geological description of the southern part of the island, a list of fossil plants col-

lected from the north side of Hillsborough Bay and from the south side of lot 65. The sandstones and shales of this area are reddish and brown in colour, and were formerly classed by Sir William Dawson as of Triassic age. The species obtained by Mr. Bain included among others *Calamites suckovii, C. gigas, Pecopteris arborescens, P. rigida, Knorria,* and *Walchia gracilis,* which were held to ally this part of the formation more closely to the upper Carboniferous or Permian than to the Trias. The thickness of the rocks of this division, as seen at Rice Point at the south-west entrance of Hillsborough Bay, opposite St. Peters island, is given as 1,241 feet, and Bain clearly distinguished these rocks from those found at New London on the north side of the island, which he still supposed might be regarded as of Triassic age from the finding in the strata of that place the remains of the curious fossil reptile which was known as *Bathygnathus borealis,* and which was described by Professor Leidy, in 1854. (Pro. Acad. Nat. Sci., Philadelphia.)

In the *Canadian Record of Science,* vol. I., 1884-5, a second paper was published in connection with somewhat detailed remarks by Sir William Dawson. This paper was read at the May meeting of the Royal Society of Canada, 1885, and was entitled "Notes on the Geology and Fossil flora of Prince Edward Island."

In this paper Bain arranged the rocks of the island under three heads or divisions, viz.:—

1st. A lower series of greyish, brown and red sandstones and shales, styled by Sir William Dawson Permo-carboniferous, with an estimated thickness of 800 feet. The contained fossil plants were regarded as of distinctly Carboniferous age, and included *Calamites suckovii, C. cistii, C. cannæformis, Dadoxylon Acadianum* and *Trigonocarpum,* which were associated with forms of a Permian character.

2nd. A middle series, conformable to the lower, or nearly so, consisting of red sandstones and shales, having an estimated thickness of about 2,000 feet; in which the shales with calcareous sandstones predominate in the lower portion. These are found over the greater part of the island but in the western area the thickness becomes greatly reduced. The contained fossil plants recognized were *Calamites gigas, Pecopteris arborescens, Walchia,* stems of *Araucarites* allied to the *Walchia,* and impressions of large and thick leaves like *Nœggeratia,* with *Dadoxylon Edvardium.*

The strata are regarded as slightly disturbed by three anticlinal lines having a course approximately parallel to the Cobequid range in Nova Scotia. Near the summit of this division beds of quartzose conglomerate occur, and are found on the Murray Harbour road and about

the head waters of the North River, as well as at other places near the centre of the island. These rocks were regarded as of Permian age.

3rd. A series of horizontal beds of red shales and sandstones, lithologically similar to the rocks of div. 2, which were regarded as resting upon the denuded strata of the most northerly anticline, and as occurring along certain portions of the north side of the Island, as at New London and in the vicinity. The rocks of this division he supposed might safely be assigned to the Trias, and the thickness of the formation was estimated at 150 feet only. Similar strata are found at Cape Turner to the east, and occasional impressions of plant stems are found, though generally too indistinct for accurate information. The age of the rocks of this division was based on the fossil *Bathygnathus* already referred to. As a whole, the plant remains were supposed to belong to species somewhat distinct from those found in the rocks of division 2.

Regarding the structure of the Prince Edward rocks as a whole, Bain held that the most northerly anticline was found at Cape Tryon on the north shore, and that another appeared at Campbell's Cove. Among other fossil plants found by Bain was the species known as *Tylodendron,* a form very like *Knorria,* which was referred to Sir William Dawson and described by him under the name *T. Baini,* in the Memoirs or Bulletin of the Redpath Museum of McGill University, 1890.

In the Auk, Vol. III., 1885, Mr. Bain published a short note on the last known occurrence on Prince Edward Island of the Wild Swan.

Among other papers written by Mr. Bain, but which have apparently never been fully printed, the articles being delivered as lectures in Charlottetown and elsewhere in the Island or communicated to the local press, may be mentioned the following :—

BIBLIOGRAPHY OF FRANCIS BAIN.

BOOKS:

The Natural History of Prince Edward Island, authorized for the use of Schools by the Board of Education. Charlottetown, G. Herbert Hazard, publisher, 1890.

Birds of Prince Edward Island, their habits and characteristics. Printed by Hazard and Moore, Charlottetown, 1891.

ARTICLES:

Canadian Science Monthly. Published, Kentville, N.S.

Vol. III., 1885, No. 2, February. Birds in Prince Edward Island. Two notes—"Snow-flea," and "Rough Caterpillar."

Vol. III., 1885, No. 3, March. Shells of Prince Edward Island.

Vol. III., 1885, Nos. 4 and 5, April and May. Butterflies of Prince Edward Island, 12 species.

Vol. III., 1885, No. 6, June. Glacial Moraines in Prince Edward Island.
Vol. III., 1885, No. 7, July. Cranberry Sports.
Vol. III., 1885, No. 8, August. Botanical and Entomological notes in correspondence column, signed F. Bain.
Vol. III., 1885, No. 9, September. Winter Birds in Prince Edward Island. Reprinted from the "Auk."
Vol. III., 1885, Nos. 10 and 11, October and November. Bounding the Trias.

Canadian Naturalist, Montreal.
Vol. IX, 1881; No. 9. Notes on Fossils from the Red sandstone system of Prince Edward Island. Read at meeting of Natural History Soc., Montreal, 1881. January 31, 1881.

Canadian Record of Science, Montreal.
Vol. I., No. 3, July, 1885. Notes on the Geology and Fossil Flora of Prince Edward Island, by F. Bain and Sir William Dawson. Read before the Royal Soc. Canada, May, 1885.
Vol II., April, 1887. Notes on a Permian Moraine in Prince Edward Island.

Science.
Vol. XXI., No. 527, March 10th, 1893. The Permian in Prince Edward Island.

Illustrated Christian Weekly.
Vol. XIV., No. 14, April 5th, 1884. Northern Birds in Winter.
No. 28 July 12th, 1884. Some Northern Birds.

Protestant Union, July 9th, 1885. Science and Religious Feeling.

Lectures and Papers read before the Literary and Scientific Institute, Charlottetown, P.E.I.
Geology of Prince Edward Island, February 27th, 1883.
The Ice Age in Prince Edward Island, February 27th, 1883.
Darwinism, November, 25th, 1886.
Land Marks in Geological History, December 27th, 1886.
On the Boulder Formation in Prince Edward Island.
The Geology of the proposed Straits Tunnel, Nat. Hist. Soc., January 13th, 1891.
The Study of our Asters, April and July, 1889. Nat. Hist. Soc.
Red Sandstone of Prince Edward Island, April 28th, 1890. Nat. Hist. Soc.
An Ancient River. Unpublished manuscript.
The Tylodendron. The last paper written by Mr. Bain, a few days before he was stricken with paralysis, and unpublished.
Mussel-mud, prize essay for Provincial Exhibition, and published in the Daily Examiner newspaper, Charlottetown, Nov. 20th, 1891.
Notes of a Naturalist. Fourteen papers published in the Daily Examiner, Charlottetown, 1881-82-83.

Daily Examiner.
Geology of Prince Edward Island, January, 1882.
Geology of St. Peter's Island, February, 1882.
Ancient Glaciers of Prince Edward Island, March, 1882.
Those February Storms, March, 1882.
Tunnelling the Straits, April, 1882.

When was Prince Edward Island separated from the mainland, April, 1882.
The Coal field under Prince Edward Island, April, 1882.
Cape Turner, August, 1882.
Our bright Blue-Jay, January, 1883.
Age unto Age, March, 1883..
The Highlands of Prince Edward Island, April, 1883.
Our own Coast, April, 1883.
Cape Wolfe, June, 1883.
The Sand-hills, June, 1883.
Rustico, August, 1883.
The Erosion of our valleys, August, 1883.
Birds of Prince Edward Island, January, 1885.
On the Western shore,, October, 1885.
In New London, September, 1886.
St. Peter's, November, 1886.
Our Lobsters and Oysters, August, 1887.
Destruction of the Lobster fishery, August, 1887.
The Waterworks Spring, June, 1888.
Over to Pictou, September, 1888.
Articles and Letters on Rust in grain, November, 1889.
The Tylodendron, November, 1889.
Rock strata underlying the city, (Charlottetown). December, 1889.
Underground ways of the city, December, 1889.
Governor's Island, January, 1890.
Notes on the exhibit of Grasses at the Provincial Exhibition, September, 1890.
An Interesting Problem, December, 1891.
Improving our Climate, February, 1892.
Tormentine and the Tunnel-borings, November, 1892.
Crossing the Capes.

Chignecto Post. The Geology of Sackville. February, 1892.

VII.—*A Submerged Tributary to the Great Pre-Glacial River of the Gulf of St. Lawrence.*

By H. S. POOLE, D.Sc.

Associate of the Royal School of Mines.

(Read May 19, 1903.)

The chart of the Gulf of St. Lawrence has an interest for the geologist, as well as value for the navigator and the geographer. It tells of much more than the mere depth of the water and the position of the shore lines and it certainly suggests more of the unseen than many similar publications.

When the isobaths that stud the surface of the chart are noted and contoured, more is portrayed than would otherwise be suspected.

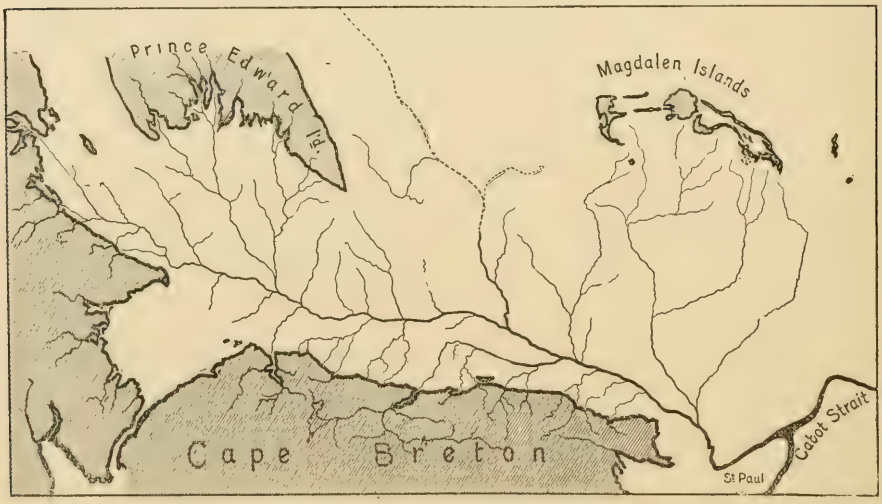
The whole story which these contours and soundings disclose, it is not here proposed to review. Part of it has already been written, and its importance has been fully recognized in the case of the broad valley that carried onward the St. Lawrence river through the gulf and Cabot Strait to the ocean, to the abyss of the Atlantic, 100 miles beyond the existing shores.

The part of the gulf to which reference will now be made, lies on the south side of the great valley. It was a high plateau when the St. Lawrence river rolled its erosive floods past it to the sea, and contours on the charts of its surface indicate a previous existence of a complete drainage system, only partially disguised by subsequent deposits and the obliterating effect of waves and currents as the water rose and covered the land. The drainage of the region stands revealed when it is elevated a few hundred feet or more above its present level. It was chiefly concentrated in two main channels, one on the east and the other along the west confines of the area, both discharging northward into the ancient great river. The channel to the west was an extension of the present Baie des Chaleurs, and received the waters of the Metapedia, the Restigouche and, by a branch of the estuary, the Miramichi, and other streams of northern New Brunswick; while the eastern channel carried to an embouchure near the island of St. Paul, in Cabot Strait, the rivers that now empty into the gulf from the eastern districts of Nova Scotia, and the western parts of Cape Breton.

The necessary data not being at hand to enable the whole of the area to be contoured, the eastern channel only has been worked out. It is the one shown on the accompanying map. When the subject was

taken up there was no set purpose to find a departed river or to develop such a structure as the map shows. There was no expectation of such a result being reached, but as order and plan seemed to grow under the pencil and eraser, the work developed into system as represented. Through paucity of information, infrequent soundings in many parts, some minor license required to be exercised to supply the want of detail, and in such places, fewer brooks and branches to the river are shown than must have existed.

The method pursued in working out the structure was by running contour lines in the manner ordinarily adopted in plotting land surveys, and which actual observation has justified. When so treated, the



undersea floor was found to take on a structure with depressions methodically arranged, decreasing in depth as distance landward increased from the edge of the plateau taken at 100 fathoms. Then connecting the embayments along these contours by lines of shortest distance, a system of drainage stood revealed along continuously descending grades, such as would be occupied by flowing streams over a similar land surface.

There are certain features of the submerged river courses that may be of sufficient interest to note. There is the greater proximity of the river to the present shore line where the coast is bolder and the oldest and hardest rocks touch the sea, determining in the early stages of the previous cycle the direction of the drainage parallel to the hill ranges. This parallel feature is also noticeable in the mounds, once islands, which, indicated by the contours under water, likewise suggest a continuation seaward of the geological structure of the coast terrace

occupied by Carboniferous Limestone and later deposits. The fork in the main channel marking the junction of the Margaree river, is followed upstream by a broad interval many miles in length. While much of the surface smoothed over by the later deposits presents but gentle undulations, there are parts more elevated, suggestive of low hills in range with the general shore line, and in other places the contours crowd together, indicative of steep, if not precipitous banks. The soundings record but few exposed rocks and no jagged peaks, remnants of older formations projecting through the Carboniferous strata, no marked break or sharp deflections that would suggest changed conditions along the general course of the main stream, but rather a continuation of the river flowing in measures no older than the Carboniferous Limestone.

This river system gathered the waters of western Cape Breton, of the counties of Pictou and Antigonish, and of eastern and northern Prince Edward Island. It also carried off half the drainage of a large island now represented by the group of the Magdalen. The fountain head of this preglacial stream would be that of the Pictou rivers, giving it a total length of some 200 miles. An important branch joined the main stream from the westward flowing between the Magdalen and Prince Edward Island at a depth below the present shore line of 240 feet. But the sea currents and the glacial drift have obscured the structure of this part of the gulf more than on the courses of the main stream.

Nothing is shown on the map of the ancient drainage of George Bay and its connection with the Strait of Canso, the course also of a contemporary preglacial river.

Shoal ground lying between Port Hood and Cape George marks a connection of the old rock range of the Cobequid, through Pictou and Antigonish counties across the bay, with the continuation through Inverness county. Doubtless there were channels on the faulting that changed the direction of the range and influenced the sub-aerial erosion, but no conclusion was reached as to the direction of the flow into or from George Bay.

With the location of the affluents of the submerged river, the story it has to tell is not ended. It bears the stamp of family lineaments, of parent streams that irrigated the same fields in previous cycles. How many there were has not been made out, nor the relation borne by the river to the important epoch when the deposition of the thick workable coal seams marked a period of subsidence. But it does seem as though there were some relation between the patches of Coal Measures bearing workable coal fields and the area confined between the old rocks of the

hills ranging from Cape Chignecto to Cape North, and the reappearance of the Carboniferous Limestone series in the anticlines paralleling the ranges on the gulf side. The southern of these anticlines extends from Shepody bay through Wallace eastward, and is buried under Cape Bear of Prince Edward Island. The eastern anticline is exposed in the Magdalen Islands, paralleling the Cape Breton coast.

A marked feature of the submerged river system is the varied extent of the foreshore erosion, indicative of age. The charts of their contours record the recession of the shore line to an unequal degree, the least where the main channel makes its nearest approach to the old rocks of Cape George, Cape Mabou and Cape St. Lawrence and the greatest on the Prince Edward Island coast, where measured by the scale of relative hardness of the respective series of rocks on the opposite shores, data are furnished for an estimation of the period of time that has elapsed since the present stage of erosion was entered on. No conclusion has been reached as to the depth below the present shore line at which this stage began to operate, but if we assume for the sake of illustration 20 fathoms, then one mile from shore at Cape Mabou is the equivalent of some ten miles at East Point, and more than twenty-three miles at Cape Bear while Point Prim has suffered a loss of fourteen miles at half that depth.

A still greater elevation was necessary for the erosion of the lower reaches of the river with a depth of 90 fathoms, while no less than 2,500 feet would be required to give to the ancient river channel through the gulf an inclination to the ocean. This degree of elevation would allow of the erosion of the present river estuaries and mud filled harbours.

The data furnished by the river seem at least sufficient, without assuming fault limitations to the Prince Edward Island rocks, whether Permo-carboniferous, Permian or Triassic, to account for the absence east of Pictou and on the Cape Breton coast of any remnants of the softer series. On elevation occurring, the drainage off the high land of the older and more resisting rocks round the gulf would be more effective along the contact and as denudation proceeded, the channels would follow with the softer strata of the new series, and be wider and deeper as we do find them on the east and west sides to the outlets on the great St. Lawrence ancient valley. It would also be necessary to assume a somewhat greater elevation to have occurred northward. On the coast of Nova Scotia west of Pictou, the stages of the cycle had not advanced so far as along the tributary rivers and the more exposed gulf shores when subsidence took place; the lateral river of this part (represented by the Straits of Northumberland), has been formed by the drainage off the older rocks of the southern rim, but being less exposed and pro-

tected by the comparative narrowness of the sea erosion at the head of the gulf had not proceeded so far, and so it occurs that Bay Verte and Amet Sound still retain, resting on the older series, outliers of the Prince Edward Island or gulf deposit.

Similar and contemporary conditions seem also to have prevailed outside Cabot Strait, on the eastern side of Cape North, where a deep estuary received the streams from St. Ann's, the great Bras d'Or and Sydney harbor. More exposed than the gulf to the action of ocean currents, there has been more obliteration of the original features; still there is no difficulty in developing here also, a system of drainage for the ocean floor, in times preglacial, when the region was greatly elevated, and when the many rivers that now discharge directly into the sea, were all tributaries to that majestic stream, the ancient River St. Lawrence.

VIII.—*On the Relation of Moisture-content to Hardiness, in Apple Twigs.*[1]

By FRANK T. SHUTT, M.A., F.I.C., F.C.S.,

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(Read May 19, 1903).

For several years past, the writer, associated with the Horticulturist of the Experimental Farm, Mr. W. T. Macoun, has been carrying on a series of experiments in the farm orchards at Ottawa, to ascertain the effect of various methods of cultivation and treatment on the soil's moisture-content at different periods throughout the growing season; the present research was suggested by certain results obtained in that investigation.

It has of recent years been generally conceded that the management of the orchard soil, under ordinary circumstances, should be such as to furnish during the spring and early summer months an abundance of moisture for the growth of the tree and the development of its fruit, but that, later in the season, vegetative growth should be checked and the "ripening" of the wood promoted by the withdrawal of excessive moisture from the soil by the growth of a "cover crop." Regarding this as correct, and in the adoption of any system that has for its object, or rather for one of its objects, the early ripening of the season's growth, it is obvious that we indorse the view that in the ripening of the wood there is a loss of water from its tissues; in a word, that ripening may be considered largely as a drying out process, and that those varieties whose growth ripens best (loses most water) will prove the hardiest.[2] We should expect to find

[1] This paper is to be regarded merely as a preliminary note. The investigation is still being carried on, and, if subsequent results confirm those here recorded, it is proposed to make a fuller presentation of the subject at the next meeting of this Society.

[2] Hardiness, or the ability of the new growth to pass the winter without injury, is a very important consideration when selecting varieties for a commercial orchard in a northern latitude. The term, naturally, is a relative one. There are among varieties of apple, well recognized degrees of hardiness; and, even for the same variety, the hardiness may vary according to the severity of the winter and possibly certain other factors, e.g., the location of the orchard, the character of the soil and the time in the autumn at which vegetative growth ceases. It is thus seen, that while hardiness may be largely an inherited quality, it is one that may be influenced by environment.

that the moisture-content of the twigs (new growth) of an apple tree as winter approaches would be an indication as to their power to resist frost. The smaller the percentage of water at that time—and throughout the winter—the hardier would be the variety.

To test the correctness of this conclusion, the writer last January asked Mr. Macoun to select in the farm orchard ten varieties which would represent respectively those which are practically frost proof, those which are killed back in severe winters, and those which almost every winter suffer to a greater or less degree. From these trees it was proposed to take scions periodically and determine their moisture-content. The following are the varieties chosen by Mr. Macoun, in the order of hardiness, as deduced from his experience at Ottawa:—

Duchess of Oldenburg	Group I. Hardiest.
Yellow Transparent	
McMahon White	
Wealthy	Group II. Less Hardy.
Scott's Winter	
Scarlet Pippin	Group III. Probably less hardy than Group II.
Walworth Pippin	
Hebble White	Group IV. Least Hardy.
Boy's Delight	
Blenheim Pippin	

Regarding these, Mr. Macoun, after inspecting the trees last week, May 15th, 1903, reports as follows:—"Of the ten trees selected for this test I find upon examination that three only show winter killing, the other seven varieties having proved hardy to the tip—though some of them apparently suffered in other ways from the winter. The tender varieties are: (1) Boy's Delight, with terminal buds killed and twigs in a few instances killed back 3 inches; (2) Hebble White, showing terminals of twigs in many instances killed back about 3 inches, and (3) Blenheim Pippin, evidently the most tender of all—terminal buds killed and wood killed back 3 to 6 inches, and in some cases more."

The first specimens were cut for analysis on January 23rd,[1] and have been taken fortnightly since that date. At these periods, three or four scions were taken from each tree. These were approximately divided each into two portions, so that in addition to the determination

[1] The investigation should rather have commenced about the time the leaves began to fall in the autumn, but unfortunately it was not thought of till nearly the end of January.

of water in the whole twig, estimations of the water in the basal and terminal portions, respectively, could be made.

The data obtained from the first determination, arranged in the order of the moisture-content of the whole twig, are as follows:—

PERCENTAGE OF WATER IN APPLE TWIGS, JANUARY 23RD, 1903.

VARIETY	BASAL PORTION	TERMINAL PORTION	WHOLE TWIG
Yellow Transparent	45 55	45 10	45 30
McMahon White	45 45	46 96	46 14
Duchess	45 02	47 51	46 15
Walworth Pippin	44 72	47 67	46 20
Boy's Delight	44 74	47 75	46 25
Wealthy	46 82	48 72	47 70
Scarlet Pippin	47 13	49 92	48 58
Hebble White	49 09	48 82	48 91
Scott's Winter	47 50	50 36	48 98
Blenheim Pippin	48 93	51 58	50 24

From these results it may be observed: (1) That there is a difference of practically 5 per cent in the moisture-content between the extremes of the series.

(2) That, while certain of the varieties furnish data almost identical, the increase in moisture-content is more or less continuous and gradual throughout the series.

(3) That the terminal portion of the twig (except in the case of one or two varieties) contains more water than the basal portion, the difference being, approximately, 2 per cent.

Comparing the order of the varieties arranged according to moisture-content, with that made by the Horticulturist, at the same time keeping in mind Mr. Macoun's report of May 15th, it will be seen that there is a sufficient agreement between them to warrant the conclusion, that there is a distinct relationship between moisture-content and hardiness. Thus, the varieties Hebble White and Blenheim Pippin, placed by Mr. Macoun in the least hardy group (Group IV.), are Nos. 8 and 10 respectively in the series according to percentage of moisture. Again, it is significant that the members of Mr. Macoun's hardiest group (Group I.) are the three first on the list according to water-content (*i.e.*, contain least moisture), and that their position is practically the same on both lists. It is true that

the same order is not maintained throughout both series, but such could scarcely be expected. We should point out that the differences in moisture-content between several of the varieties are within the limits of error, and that the differences in hardiness for these varieties as expressed by Mr. Macoun's list, are as yet somewhat indefinite, for they have been determined from an extremely limited experience.

From January 23rd, until the time of writing, May 18th, eight fortnightly determinations of the moisture-content of these apple twigs have been made. Instead of inserting all the data so obtained—data, it may be said, which are in close accord with those of January 23rd,—I have prepared the following table, giving the averages of the estimations made on the several dates upon which the twigs were collected, and arranged in the order of their water-content:—

PERCENTAGES OF WATER IN APPLE TWIGS.

The Average of 8 Bi-monthly Examinations, Jan. 23rd to May 15th.

VARIETY	BASAL PORTION	TERMINAL PORTION	WHOLE TWIG
McMahon White	44 87	46 95	45 79
Yellow Transparent	45 19	46 60	45 82
Duchess	44 94	47 48	46 00
Walworth Pippin	45 36	48 18	46 58
Boy's Delight	45 28	48 47	46 75
Wealthy	47 31	48 74	48 06
Scott's Winter	46 95	49 44	48 21
Scarlet Pippin	47 00	49 65	48 23
Hebble White	48 58	50 31	49 74
Blenheim Pippin	49 12	51 15	50 01

In all essential features this table confirms the results of the first examination. The same six varieties are at the head of each list, almost in the same order. In the last four, Hebble White now stands No. 9, a position more in accord with Mr. Macoun's report. It is quite probable that future experience may show the position of Boy's Delight to be higher up in the scale of hardiness than that assigned to it this year by Mr. Macoun.

In the data furnished by this investigation extending over four months, it would seem, therefore, that we have direct and definite proof that there is distinct relationship between the moisture-content

of the twig and its power to resist the action of frost, and that those trees whose new growth contains the largest percentage of water as winter approaches, are in all probability the most tender.

Further, it seems likely that, if hardiness is dependent upon the degree of ripeness of the new growth (indicated by moisture-content), then it is quite possible that it is a quality that can be materially affected by judicious cultural methods. Hardiness, as we have remarked, is evidently something more than an inherited tendency. It seems probable that it is a quality largely under the influence of the soil condition as regards moisture and temperature in the late summer and autumn months, and probably these factors, rather than the severity of the succeeding winter, determine the tree's immunity from frost. If in northern latitudes vegetative growth be early arrested, and ripening of the new wood thus induced, either by artificial means (pruning and cover crops), or by a dry and cold autumn, varieties now considered tender might prove hardy.

The determinations of the moisture-content will be made at the regular intervals until the end of May, and then discontinued until the autumn, when the work will be again taken up. The data obtained on this season's growth at the opening of winter, will be of a very important character; for, if the deductions we have made in the preceding statement are correct, the differences at that time in moisture-content between the hardy and the tender varieties should be the largest—the former containing the least water; the latter, the most water.

IX.—*Bibliography of Canadian Entomology for the Year 1902.*

Contributed by the REV. C. J. S. BETHUNE, D.C.L.

(Read May 19, 1903.)

ALDRICH, J. M.
The Formation of Generic Names. Canadian Entomologist, XXXIV, 129 (May, 1902).

ASHMEAD, W. H.
Classification of the Fossorial, Predaceous and Parasitic Wasps, or the Super-family Vespoidea. Canadian Entomologist, XXXIV, 79-88 (April, 1902); ib. 131-137 (June); ib. 163-166 (July); ib. 203-210 (August); ib. 219-231 (September); ib. 268-273 (October); ib. 287-291 (November).

BALL, E. D.
Some new Bythoscopidæ from British Columbia and the Southwest. Canadian Entomologist, XXXIV, 303-313 (December, 1902).

BANKS, NATHAN.
New genera and species of Acarians. (Describes a new species, *Hoploderma granulata*, from Ottawa.) Canadian Entomologist, XXXIV, 171-176 (July, 1902), figures.

BETHUNE, C. J. S.
Editorial Notes and Reviews. Canadian Entomologist, XXXIV, (1902); 32nd Annual Report Entomological Society of Ontario, 1901.

BETHUNE, C. J. S.
Obituary notice (with portrait) of Miss Eleanor A. Ormerod, LL.D. 32nd Annual Report Entomological Society of Ontario, 1901, 121-125.

BETHUNE, C. J. S.
How insects pass the winter. Farmer's Advocate, London, XXXVII, 940-1 (December 15, 1902), figures.

BETHUNE, C. J. S.
General Index to the Reports and Bulletins of the Experimental Farms of the Dominion of Canada, 1887-1901; pp. 194. (Includes Dr. Fletcher's Entomological Reports and Bulletins.) Published by the King's Printer, Ottawa, 1902.

BIRD, HENRY.
New Histories and Species in Hydrœcia. (Plate with coloured figures of the nine species, three of which are described for the first time.) Canadian Entomologist, XXXIV, 108-118 (May, 1902).

BURMAN, W. A.
Entomological Notes (from Winnipeg). Ottawa Naturalist, XVI, 109 (August, 1902).

CHAGNON, G.
Notes Entomologiques. Le Naturaliste Canadien, XXIX, 129-131 (September, 1902).

CHAPAIS, J. C.
La Calandre des Greniers (*Calandria granaria*); La Sélandrie de la Ronce (*Monophadnus rubi*). Le Nat. Can., XXIX, 65-70 (May, 1902).

COCKERELL, T. D. A., and JOHN MCNARY.
Notes on the Mouth-parts of Bombus. Can. Ent., XXXIV, 71-72 (March, 1902).

EVANS, J. D.
Notes on Insects of the Year. 32nd Annual Report Ent. Soc., Ontario, 1901, pp. 26-27.

EVANS, J. D.
Collecting at Light in 1901. 32nd Annual Report Ent. Soc., Ontario, 1901, p. 82.

FISHER, GEORGE E.
Report of the Inspector of San José Scale. Annual Report of the Ontario Department of Agriculture, 1901, Vol. 1, No. 54, 16 pages.

FISHER, GEORGE E.
The San José Scale. 32nd Annual Report Ent. Soc., Ontario, 1901, pp. 3-6. 33rd Annual Report Fruit Growers' Assoc., Ont., 1901, pp. 18-25.

FISHER, GEORGE E.
The Spruce Gall-louse. *Chermes abietis*. Can. Horticulturist, XXV, 377 (September, 1902) figures.

FLETCHER, JAMES.
Report of the Entomologist and Botanist. Experimental Farms Report, Ottawa, 1901, pp. 197-262 (plate and 19 figures).

FLETCHER, JAMES.
Insects, Fungous Diseases, Treatments. Evidence before the Select Standing Committee on Agriculture and Colonization. House of Commons, Ottawa, March 20, April 2 and 3, 1902, pp. 56.

FLETCHER; JAMES, *et al.*
Report of the Entomological Branch of the Ottawa Field-Naturalists Club. Ottawa Naturalist, XVI, 114-118 (August, 1902).

FLETCHER, JAMES, and GIBSON, ARTHUR.
The Life History of the Variable Cut worm, *Mamestra Atlantica*, Grote. Can. Ent., XXXIV, 279-284 (November, 1902.)

FLETCHER, JAMES.
The San José Scale in Ohio and Ontario. 32nd Annual Report Ent. Soc., Ontario, 1901, pp. 7-10.

FLETCHER, JAMES.
The Painted Lady Butterfly, *Pyrameis cardui*, Linn. 32nd Annual Report Ent. Soc., Ontario, 1901, pp. 54-57.

FLETCHER, JAMES.
Entomological Record, 1901. 32nd Annual Report Ent. Soc., Ontario, 1901, pp. 99-108.

FLETCHER, JAMES.
Farmers' Friends and Foes (a series of 56 articles containing replies to enquiries respecting noxious and beneficial insects). Montreal Weekly Star, January 1 to November 5, 1902.

FLETCHER, JAMES.
The Asparagus Beetles. Montreal Witness, Aug. 5, 1902,—The Buffalo Moth., ib. Sept. 16, 1902.

FLETCHER, JAMES.
Injurious Insects of the Year. Montreal Weekly Star, Oct. 29, 1902.

FRENCH, G. H.
The Yellow-winged Catocalæ. Can. Ent., XXXIV, 95-98 (April, 1902), figures.

FYLES, THOMAS W.
A Tortoise beetle new to Quebec. (A British species introduced into Canada, *Cassida viridis*, Linn.; feeds upon burdock and thistle.) Can. Ent., XXXIV, 273-4 (Oct., 1902).

FYLES, THOMAS W.
The importance of Entomological Studies to the Community at large. (Presidential Address.) 32nd Annual Report Ent. Soc., Ontario, 1901, pp. 13-21 (figures).

FYLES, THOMAS W.
Crickets. 32nd Annual Report Ent. Soc., Ontario, 1901, pp. 90-94 (figures).

GIBSON, ARTHUR.
Notes on the Larvæ of *Arctia virgo*, Linn. Can. Ent., XXXIV, 23-25 (January, 1902).

GIBSON, ARTHUR.
Additional Notes on the Life History of *Arctia phalerata*, Harr. Can. Ent., XXXIV, 50-51 (Feb., 1902).

GIBSON, ARTHUR.
Note on the Larvæ of *Penthina hebesana*, Walk. Can. Ent., XXXIV, 182 (July, 1902).

GIBSON, ARTHUR, and FLETCHER JAMES.
The Life History of the Variable Cut worm, *Mamestra Atlantica*, Grote. Can. Ent., XXXIV, 279-284 (Nov., 1902).

GIBSON, ARTHUR.
An interesting Caterpillar (*Macrurocampa marthesia*). Ottawa Naturalist, XVI, 161 (Nov., 1902).

GIBSON, ARTHUR.
A Day at the Mer Bleue (Eastman's Springs, Ont). 32nd Annual Report Ent. Soc., Ontario, 1901, pp. 110-112.

GREGSON, PERCY B.
Presidential Address to the North-west (Canada) Entomological Society. 32nd Annual Report Ent. Soc., Ontario, 1901, pp. 116-120 (figures).

GROTE, A. RADCLIFFE.
Notes on Mr. Lyman's papers. Can. Ent., XXXIV, 75-76 (March, 1902).

GROTE, A. RADCLIFFE.
Changes in the colour of Butterflies. Can. Ent., XXXIV, 94 (April, 1902).

GROTE, A. RADCLIFFE.
Callosamia angulifera. Can. Ent., XXXIV, 314 (Dec., 1902).

HARRINGTON, W. HAGUE.
Note on *Pityophthorus coniperda*, Schwarz. Can. Ent., XXXIV, 72-73 (March, 1902).

HARRINGTON, W. HAGUE.
A Canadian Anoplonyx (Describes a new species, *A. Canadensis*). Can. Ent., XXXIV, 93-94 (April, 1902).

HARRINGTON, W. HAGUE.
Fauna Ottawaensis-Hymenoptera: Super-Family 11, Sphegoidea. Ottawa Naturalist, XV, 215-224 (Jan., 1902).

HEATH, E. FIRMSTONE.
A few notes on the Lepidoptera of 1901 in Southern Manitoba. Can. Ent., XXXIV, 33-36 (Feb., 1902).

JOHNSON, CHARLES W.
New North American Diptera. (Describes four new species, one of which, *Psilocephala grandis*, is from Rouville Co., P. Que.) Can. Ent., XXXIV, 240-242 (Sept., 1902).

JOHNSTON, JAMES
Notes on Insects of the Year. 32nd Annual Report Ent. Soc., Ontario, 1901, pp. 27-28 (figures).

KING, GEORGE B.
Coccidæ of British North America. (Describes a new species, *Eulecanium fraxini*, from Ottawa, and gives a list of Canadian species with their geographical distribution.) Can. Ent. XXXIV, 158-161 (June, 1902); ib. 166 (July), Errata.

LOCHHEAD, WM.
Report of the Inspector of Fumigation Appliances. Annual Report of the Ontario Department of Agriculture, 1901, Vol. I, No. 18, 16 pages.

LOCHHEAD, WM.
Spray Calendar; directions for treatment of Insect Pests and Plant Diseases. Ontario Agricultural College, Bulletin 122, pp. 12.

LOCHHEAD, WM.
The story of the Cabbage Butterfly. Nature Study or Stories in Agriculture. Ont. Agric. College, Bulletin 124, pp. 37-42 (figures).

LOCHHEAD, WM.
Injurious Insects of the Season of 1901. 32nd Annual Report Ent. Soc., Ontario, 1901, pp. 43-50 (figures).

LOCHHEAD, WM.
The Hibernation of Insects. 32nd Annual Report Ent. Soc., Ontario, 1901, pp. 74-78 (figures).

LOCHHEAD, WM.
Nature Study Lessons on Mosquitoes. 32nd Annual Report Ent. Soc., Ontario, 1901, pp. 94-98 (figures).

LOCHHEAD, WM.
Notes from the Biological Department, Ont. Agric. College; The home of the San José Scale; the Hazeltine Moth-Catcher. Can. Horticulturist, XXV, 5-6 (Jan., 1902). The Plum-twig Gall-mite, ib. XXV, 150-151 (April, 1902), figures.

LYMAN, HENRY H.
Synonymic Notes. Can. Ent., XXXIV, 27-28 (Jan., 1902). A correction of Generic names proposed in the preceding article. Can. Ent., XXXIV, 52 (Feb., 1902).

LYMAN, HENRY H.
Notes on *Lycæna Scudderii*, Edw. Can. Ent., XXXIV, 126-128 (May, 1902).

LYMAN, HENRY H.
Mr. Grote's criticisms. Can. Ent., XXXIV, 167-169 (July, 1902).

LYMAN, HENRY H.
What is a Genus? (Discusses the names Ammalo, Cycnia, Euchætes and Pygarctia, with figures of aberrations in venation.) Can. Ent., XXXIV, 187-192 (Aug., 1902).

LYMAN, HENRY H.
Hydrœcia nelita, Strecker. (This name has priority over *H.* (*Gortyna*) *ærata* Lyman.) Can. Ent. XXXIV, 274 (Oct., 1902).

LYMAN, HENRY H.
The North American Fall Webworms. 32nd Annual Report Ent. Soc., Ontario, 1901, 57-62 (plate).

MCNARY, JOHN, and COCKERELL, T. D. A.
Notes on the Mouth-parts of Bombus. Can. Ent., XXXIV, 71-72 (March, 1902).

MOFFAT, J. ALSTON.
Notes on the season of 1901. 32nd Annual Report Ent. Soc., Ontario, 1901, pp. 50-53 (figures).

MOFFAT, J. ALSTON.
Anosia Archippus does not hibernate. 32nd Annual Report Ent. Soc., Ontario, 1901, pp. 78-82 (figure).

OUELLET, C. J.
Liste des Coléoptères les plus remarquables capturés dans la Province de Québec en 1899, 1900 et 1901. Le Nat. Can., XXIX, 82-87 (June, 1902); 103-105 (July); 120-124 (Aug.); 139-141 (Sept.).

PEARSALL, RICHARD F.
Life History of *Lyda fasciata*, Norton, family Tenthredinidæ. Can. Ent., XXXIV, 214-216 (Aug., 1902).

PETTIT, R. H.
The egg of the Water Scorpion, *Ranatra fusca*. Can. Ent., XXXIV, 212-213 (Aug., 1902), figures.

ROBERTSON CHARLES.
Synopsis of Halictinæ. Can. Ent., XXXIV, 243-250 (Sept., 1902).

ROY, ELIAS.
L'Onthophagus nuchicornis, Linn. Le Nat. Can., XXIX, 81-82 (June, 1902).

ROY, ELIAS.
Encore Un. (Records the finding of the green Tortoise beetle, *Cassida thoracica*, Ill. (since proved by Dr. Fyles to be *C. viridis*, Linn) at Quebec.) Le Nat. Canadien, XXIX, 145-149 (Oct., 1902), figures.

SAUNDERS, WM.
Bees and Fruit. 33rd Annual Report Fruit Growers' Assoc., Ont., 1901, pp. 31-34.

SMITH, JOHN B.
Three new Noctuids from British North America. Can. Ent., XXXIV, 29-32 (Feb., 1902).

SMITH, JOHN B.
Hydrœcia Americana, Speyer, or Hydrœcia Atlantica, Smith. Can. Ent., XXXIV, 32-33 (Feb., 1902).

STEVENSON, CHARLES.
Commercial Entomology, or Insects and Insect-Products met with in Commerce. 32nd Annual Report Ent. Soc., Ontario, 1901, pp. 113-115.

STEVENSON, CHARLES.
Un nouveau Rhopalocère pour la Province de Québec (Records the capture of *Cœnonympha inornata*, Edw., at Piedmont in the Laurentides.) Le Nat. Can., XXIX, 179 (Dec., 1902).

TWEDDLE, JOSEPH.
Report of Committee on Codling Moth for the year 1901. 33rd Annual Report Fruit Growers' Assoc., Ontario, 1901, pp. 7-9.

WALKER, E. M.
The Canadian species of Trimerotropis. Can. Ent., XXXIV, 1-11 (Jan., 1902), plate. (Describes and figures three new species.)

WALKER, E. M.
A preliminary list of Acridiidæ of Ontario. Can. Ent., XXXIV, 251-258 (Oct., 1902).

WALKER, E. M.
A collecting trip in South-western Ontario. 32nd Annual Report Ent. Soc., Ontario, 1901, pp. 85-90.

WALKER, E. M.
Entomological Record; Orthoptera. 32nd Annual Report Ent. Soc., Ontario, 1901, pp. 108-109.

WEBSTER, F. M.
The Trend of Insect Diffusion in North America. 32nd Annual Report Ent. Soc., Ontario, 1901, pp. 63-67 (maps).

WEBSTER, F. M.
The imported Willow and Poplar Curculio, *Cryptorhynchus lapathi*, Linn. 32nd Annual Report Ent. Soc., Ontario, 1901, pp. 67-73 (figures).

WEBSTER, F. M.
The common cheese mite, *Tyroglyphus siro*, living in Sporotrichum globuliferum. 32nd Annual Report Ent. Soc., Ontario, 1901, pp. 73-74.

WILLIAMS, J. B.
The food of the Grass Snake (Cutworms). 32nd Annual Report Ent. Soc., Ontario, 1901, p. 115.

WILLIAMS, J. B.
Scudder's Blue (*Lycæna Scudderii*). Ottawa Naturalist, XV, 234 (Jan., 1902).

WINN, ALBERT F.
The Milkweed at dusk (attracting insects). 32nd Annual Report Ent. Soc., Ontario, 1901, pp. 82-84 (figures).

YOUNG, C. H.
Notes on Insects of the Year. 32nd Annual Report Ent. Soc., Ontario, 1901, pp. 24-26 (figures).

X.—*Bibliography of Canadian Zoology for 1902, exclusive of Entomology.*

By J. F. WHITEAVES.

(Read May 19, 1903.)

MAMMALIA.

BISHOP, WATSON L.

The Star-nosed Mole (*Condylura cristata*), its breeding habits, etc.
Trans. Nova Scotia Inst. Sc., Vol. X, pp. 348 and 349.

BROOKS, ALLAN.

Mammals of the Chilliwack District, B.C.
Ottawa Naturalist, Vol. XV, pp. 239-244.

HALKETT, ANDREW.

Observations of Animals native in the Algonquin Park. (Contains notes on some common mammals, birds, etc.)
Ottawa Naturalist, Vol. XVI, pp. 155-161.

HUARD, L'ABBE V. A.

L'Ecureil volant de Labrador. (The squirrel referred to is *Sciuropterus sabrinus makkovicensis*, Sornborger.)
Le Naturaliste Canadien, Vol. XXIX, pp. 152 and 153.

MOORE, W. H.

A Hybrid of Sheep and Deer.
Ottawa Naturalist, Vol. XVI, pp. 162 and 163.

BIRDS.

ALLEN, J. A.

The American and European Herring Gulls. (The author maintains that *Larus Smithsonianus* is not distinct from L. *argentatus*. The former name is to be eliminated from the A.O.U. check list.)
The Auk, Vol. XIX, pp. 283 and 284.

AMES, J. H.

Ontario Bird Notes. (Records the capture of a pair of Little Blue Herons (*Ardea cœrulea*) and a Canada Jay at Aylmer, Ont., not P.Q.; and of a Pine Grosbeak at Whitby.
The Auk, Vol. XIX, p. 94.

Solution of the Ornithological Mystery. (Consists of some notes on a live Yellow Rail (*Porzana Noveboracensis*) taken near Toronto.)
Idem, Vol. XIX, pp. 94 and 95.

BEAUPRE, E.

Note on the breeding of the Short-eared Owl (*Asio accipitrinus*) near Kingston, Ont.
Ottawa Naturalist, Vol. XVI, p. 103.

BETHUNE, REV. DR. C. J. S.
Recollections of the Passenger Pigeon.
Ottawa Naturalist, Vol. XVI, pp. 40-44.

BIGELOW, HENRY B.
Birds of the Northeastern Coast of Labrador.
The Auk, Vol. XIX, pp. 24-31.

CLARKE, DR. C. K.
Ornithological notes from Kingston, Ont.
Ottawa Naturalist, Vol. XVI, pp. 87 and 88.

COUBEAUX, EUGENE.
Synopsis of the Birds of the Saskatchewan Valleys and Tributaries.
Ottawa Naturalist, Vol. XV, pp. 245-249.
Contributions to the Natural History of the North-West Territories. No. 2, Bird Notes.
Idem, Vol. XVI, pp. 44-46.

DEANE, RUTHVEN.
Unusual Abundance of the Snowy Owl (*Nyctea nyctea*) in New England and Canada.
The Auk, Vol. XIX, pp. 271-283.

ELLIOTT, ROBERT.
The Parula Warbler.
Ottawa Naturalist, Vol. XVI, p. 96.

FLEMING, J. H
Cory's Bittern.
The Auk, Vol. XIX, p. 77.
American Avocet and American Three-toed Woodpecker in Toronto.
Idem, Vol. XIX, p. 79.
Further notes on the Snowy Owl in Toronto.
Idem, Vol. XIX, p. 400.
Notes and additions to Birds of Parry Sound and Muskoka.
Idem, Vol. XIX, pp. 403 and 404.

HOBSON, W. D.
Capture of the White-eyed Vireo near Woodstock, Ont.
Ottawa Naturalist, Vol. XVI, p. 163.

HOWE, REGINALD HEBER, Jun.
Occurrence of the Barn Owl in Canada.
The Auk, Vol. XIX, p. 79.
The Labrador Savanna Sparrow. (Now called *Passerculus savanna labradorius.*)
Idem, Vol. XIX, p. 85.

KEAYS, J. E.
The Cardinal an Established Resident of Ontario.
The Auk, Vol. XIX, pp. 205 and 206.

KELLS, W. L.
Nesting of some Canadian Warblers.
Ottawa Naturalist, Vol. XV, pp. 225-233.
Notes on some Winter Birds.
Idem, Vol. XVI, pp. 53 and 54.
Nesting of some Canadian Warblers.
Idem, Vol. XVI, pp. 144-148.
Nesting of some Canadian Warblers (Second Paper).
Idem, Vol. XVI, pp. 178-186.

KENNARD, FRED. H.
The Yellow-crowned Night Heron (*Nycticorax violaceus*) in Nova Scotia. (Records the capture of three specimens in Shelburne and Yarmouth counties.)
The Auk, Vol. XIX, pp. 396-397.

LUCAS, DR. D. V.
Birds of New Zealand.
Journ. and Proc. Hamilton Scientific Assoc., No. XVIII, pp. 20-29.

MACOUN, W. T.
Bird Notes.
Ottawa Naturalist, Vol. XV, p. 266.

MOORE, W. H.
The Winter Fringillidæ of New Brunswick.
The Auk, Vol. XIX, pp. 199-202.
The Bobolink's Love for Its Home.
Ottawa Naturalist, Vol. XV, pp. 235-236.
What the Swallows did.
Idem, Vol. XVI, pp. 121 and 122.
Notes on some Canadian Birds.
Idem, Vol. XVI, pp. 130-134.

NORRIS, J. PARKER, JUN.
Nesting of the Tennessee Warbler in British Columbia. (The locality from which a nest and set of four eggs of this species were taken is Carpenter Mountain, Cariboo.)
The Auk, Vol. XIX, pp. 88 and 89.

OUIMET, GUSTAVE.
Le Départ et le Retour des Oiseaux.
Le Naturaliste Canadien, Vol. XXIX, pp. 49-51.

RICHMOND, CHARLES W.
The Correct Name for the Canadian Pine Grosbeak. (The author claims that it should be *Pinicola enucleator leucura* (Muller).
The Auk, Vol. XIX, p. 85.

SAUNDERS, W. E.
The Ipswich Sparrow in its Summer Home.
The Auk, Vol. XIX, pp. 267-271.
The Spots on the Eggs of the Great Blue Heron.
Ottawa Naturalist, Vol. XV, pp. 282-284.

SAUNDERS, W. E.

The American Scoter in Middlesex (Ont.).
Idem, Vol. XV, pp. 284 and 285.

Birds of Sable Island.
Idem, Vol. XVI, pp. 15-31.

Bird Notes. (The Long-tailed Jaeger in Ontario; the White Pelican in Ontario, etc.)
Idem, Vol. XVI, pp. 55 and 56.

Canadian Humming birds.
Idem, Vol. XVI, pp. 97-103.

Early Nesting in 1902.
Idem, Vol. XVI, pp. 107-109.

WHITEAVES, J. F.

The Golden Eagle (*Aquila chrysætos*) in Ontario.
Ottawa Naturalist, Vol. XV, p. 249.

Note on the nesting of the Northern Raven (*Corvus corax principalis*) in Canada.
Idem, Vol. XVI, p. 86.

Additions to the Geological Survey's Collection of Eggs in June, 1902.
Idem, Vol. XVI, p. 96.

The Acadian Sharp-tailed Sparrow (*Ammodramus caudacutus subvirgatus*). (Records the discovery of a nest of this species, with four eggs, at Wolfville, N.S.)
Idem, Vol. XVI, p. 162.

REPTILES, BATRACHIANS AND FISHES.

HUARD, L'ABBE V. A.

Une Salamandre (*Amblystoma*) Nouvelle dans la province de Qubeec. The species, as determined by Professor Macoun, is *A. Jeffersonianum*, var. *laterale*.
Le Naturaliste Canadien, Vol. XXIX, pp. 33-35.

Les Lamproies.
Idem, Vol. XXIX, pp. 166-169.

WHITEAVES, J. F.

A Canadian Two-headed Snake.
Ottawa Naturalist, Vol. XVI, p. 148.

INVERTEBRATA.

DALL, DR. W. H.

Synopsis of the family Veneridæ and of the North American species. (Includes a revision of the nomenclature of the Veneridæ of the Atlantic and Pacific coasts of Canada.)
Proc. U.S. Nat. Mus., Vol. XXVI, pp. 335-412.

MACBRIDE, PROF. E. W.

The development of *Echinus esculentus*.
Proc. Royal Soc., London, Vol. 69, pp. 268-276, with text figures 1-8.

STAFFORD, DR. J.

Notes on Worms.
Zoologischen Anzeiger, Bd. XXV, pp. 481-483.

Cephalogonimus americanus (new species). (Is a description, with figures, of a new Canadian trematode, from the duodenum of two species of frogs.)
Centralblatt für Bakteriologie, etc., Bd., XXXII, pp. 719-725, with one unnumbered plate.

The American Representatives of *Distoma variegatum.*
Zoologischen Jahrbüchern, Bd. XVI, pp. 895-912, pl. 33.

The American Representatives of *Distoma cygnoides.*
Idem, Bd. XVII, pp. 411-424, pl. 19.

STERKI, DR. V.

Some notes of the North American Caliculinæ, with new Species. (The genus *Caliculina*, the author states, was indicated without a name by Temple Prime in 1865, and named by Clessin in 1870. It includes several small fresh water bivalves that differ from *Sphœrium* proper, in their thinner test, smoother surface and calyculate beaks. *Calyculina transversa* (Say) and *C. securis*, Prime, are common in Canada east of the Rocky Mountains, and *C. partumeia* (Say) and *C. truncatum*) (Linsley) are said to occur in that region. But, Dr. Dall, in a Revision of the Cyrenacea, in the Proc. of the Biol. Soc. of Washington for Feb. 21, 1903, says that *Calyculina* is synonymous with *Musculium*, Link, 1807, and that the latter is only a subgenus of *Sphœrium.*)
The Nautilus, Vol. XVI, pp. 88-93.

WHITEAVES, J. F.

Notes on some Fresh-water and Land shells from Keewatin, Northern Ontario and British Columbia.
Ottawa Naturalist, Vol. XVI, pp. 91-93.

MISCELLANEOUS.

AUTHOR'S NAME NOT GIVEN.

Biological Station of Canada.
Ottawa Naturalist, Vol. XVI, pp. 46-52.

MACBRIDE, PROF. E. W.

Inaugural Address of the President of the Natural History Society of Montreal. October, 1901.
Canadian Record of Science for January, 1902, Vol. VIII, pp. 479-492.

OTTAWA FIELD NATURALISTS CLUB.

Report of the Zoological Branch for 1901.
Ottawa Naturalist, Vol. XVI, pp. 135-137.

SCHMITT, DR. JOSEPH.

A Summer Colony at Anticosti.
The Auk, Vol. XIX, pp. 181-183.
Fin d'été à Anticosti.
Le Naturaliste Canadien, Vol. XXIX, pp. 161-166.

XI.—*Botanical Bibliography of Canada, 1902.*

By A. H. MACKAY, LL.D.

(Read May 19, 1903.)

CAMPBELL, ROBERT.

History of the Progress of Botany in the Nineteenth Century. Read 13th March, 1902, in Somerville Course of Lectures, Natural History Society of Montreal.

Montreal Asters and Golden Rods. Read 29th March, 1902, in Somerville Course of Lectures, Nat. Hist. Soc., Montreal.

CAMPBELL, R. H.

The Lesser Maples. In Rod and Gun in Canada, Vol. iv., No. 2, p. 56. July, 1902, Montreal.

CANADIAN FORESTRY ASSOCIATION.

Numerous references to the applications of Botanical Science to Forest industries in its Annual Report, 128 pages, 1902, Ottawa.

Measuring Standing Timber, Temiscaming Fires, etc., in "Rod and Gun in Canada," Vol. iii., No. 8, pp. 16—20. Jan., 1902, Montreal.

Forest Fire Protection in Ontario, The Red Pine, Forestry in Nova Scotia, *Ibid*, No. 9, pp 12—15. Feb., 1902.

British Forestry Bulletins, etc., *Ibid*, No. 10, pp. 17—20. March, 1902.

Third Annual Meeting Canadian Forestry Association, etc., *Ibid*, No. 11, pp. 17—20. May, 1902.

Control of Forests, etc., in "Rod and Gun in Canada," Vol. iv., No. 3, pp. 105—107. Aug., 1902, Montreal.

The Douglas Fir, Forest Reserves, etc., *Ibid*, No. 4, pp. 141—146. Sept., 1902.

Practical Forestry, The Basswood, etc., *Ibid*, No. 5, pp. 175—181. Oct., 1902.

A Working Plan for Forest Lands, The Ash-leaved Maple, etc., *Ibid*, No. 6, pp. 210—212. Nov., 1902.

The Black Walnut, etc., *Ibid*, No. 7, pp. 262—267. Dec., 1902.

GANONG, W. F.

A Preliminary Synopsis of the Grouping of the Vegetation (Phyteography) of the Province of New Brunswick; reprinted from Bulletin, Nat. Hist. Soc. of N.B., No. xxi., pp. 47—60. St. John, 1902.

Botanical Observations in "Notes on the Natural History and Physiography of New Brunswick," No. xx., Vol. iv., pt. v., pp. 427—471. St. John, 1902.

GREENE, EDWARD L.

Some New Canadian Senecios, Ottawa Naturalist, Vol. xv., No. 11, pp. 250—251. Feb., 1902, Ottawa.

Some New North-Western Compositæ, Ottawa Naturalist, Vol. xv., pp. 278—282. March, 1902, Ottawa.

Five New *Ranunculi*, Ottawa Naturalist, Vol. xvi., No. 2, pp. 35—39. May, 1902, Ottawa.

New North-Western Plants, Ottawa Naturalist, Vol. xvi., No. 2, pp. 35—39. May, 1902, Ottawa.

Acer Macounii. In "Pittonia," Vol. v., pt. 26, p. 3. Sept.-Nov., 1902, Washington, D.C., U.S.A.

Viola Canadensis. In "Pittonia," *Ibid*, p. 24.

Romanzoffia Macounii. In "Pittonia," *ibid*, p. 37. Also *R. rubella* and *R. glauca*, pp. 37 and 38.

Chrysothamnus Macounii. In "Pittonia," *ibid*, p. 63.

Viola Brainardii. In "Pittonia," *ibid*, pp. 89 and 90. Also *V. peramœna*, p. 95; *V. prionosepala, V. consors, V. Watsoni, V. nesiotica, V. melissæfolia, V. Dicksonii*, and *V. nodosa*, pp. 99—106.

HAY, GEO. U.

Some Features of the Flora of Northern New Brunswick, Trans. Roy. Soc., Can., Second Series, Vol. viii., Section iv., pp. 125—134. 27th May, 1902, Ottawa.

Observations of Plants, 1901, Bulletin Nat. Hist. Soc of New Brunswick, No. xx., Vol. iv., pt. v., pp. 499 and 500. 1902, Saint John.

Botanical Observations in the "South Tobique Lakes," Ibidem, pp. 472—482.

HOLM, THEO.

On the Genus *Arctophila* Rupr. Ottawa Naturalist, Vol. xvi., No. 3, pp. 77—85. June, 1902, Ottawa.

IHNE, E.

Neue Phænologische Litteratur. References to Canada, page 28 of "Phænologische Mitteilungen," Sonder-Abdruck aus den Abhandlungen d. Gesellsch., xiv., Bd., Nürnberg.

MACOUN, JAMES M.

Contributions to Canadian Botany, Ottawa Naturalist, Vol. xv., No. 12, pp. 267—275. March, 1902, Ottawa.

Notes on the Willows of the Chilliwack Valley, British Columbia. Ibidem, pp. 275—276.

Taraxacum in Canada. Ibidem, pp. 276—277.

MACOUN, JOHN.

Catalogue of Canadian Plants, Part vii., *Lichenes* and *Hepaticæ*, a volume of 318 pages. Geological Survey of Canda, 1902, Ottawa.

MACOUN, W. T.

Notes on the Arboretum and Botanic Garden, Central Experimental Farm, Ottawa. Ottawa Naturalist, Vol. xvi., No. 6, pp. 123—129.

A Day at Norway Bay, P.Q. Ibidem, pp. 137—138. Sept., 1902, Ottawa.

MACKAY, A. H.

Phenological Observations, Canada, 1901. Proc. Royal Society of Canada, 2nd Series, Vol. viii., pp. cxviii-cxxxix. 1902, Ottawa.

Phenological Observations in Nova Scotia and Canada, 1901. Trans. Nova Scotia Institute of Science, Vol. x., pp. 486—506. 1902, Halifax.

Labrador Plants collected by Prest in 1901. Ibidem, pp. 507—508.

Critical reports of staff of compilers of Phenological Observations in Nova Scotia, 1901. Journal of Education, April, 1902, pp. 58—63, Halifax.

Notes and Comments on the Schedules of Phenological Observations in Nova Scotia, by the Phenological Compiling Staff, ten pages. Halifax, 1902.

OTTAWA FIELD-NATURALIST CLUB.

Annual Report of the Botanical Section. Ottawa Naturalist, Vol. xvi., No. 4, pp. 104—105. July, 1902, Ottawa.

NATURAL HISTORY SOCIETY OF NEW BRUNSWICK.

Report of its Committee on Botany. Bulletin, No. xx., Vol. iv., pt. v., pp. 496—498. 1902, Saint John.

PENHALLOW, D. P.

Osmundites Skidegatensis, n. sp. Trans. Royal Society of Canada, 2nd Series, Vol. viii., Sec. iv., pp. 3—29 (including 6 pp. of illustration). Read 27 May, 1902, Ottawa.

Notes on Cretaceous and Tertiary Plants of Canada. Trans. Roy. Soc., Can., 2nd Ser., Vol. viii., Sec. iv., pp. 31—91 (including 28 illustrations, 8 new species, 17 sp. annotated from Vancouver and Queen Charlotte Islands, 32 from Red Deer River, and 12 from Horse-fly River, B.C.). Read May, 1902, Ottawa.

Review of *Eléments de Palæobotanique.* Zeiller, R. Science xiii, 606, 1900; Amer. Nat., xxxv., 509.

A Decade of North American Palæobotany. Pres. Address, Baltimore Meeting Soc. Plant Morphol. and Physiol. Science, xiii, 161, 1901.

Studies in Fossil Botany, A Review. Scott, D. H. Science, xiii., 386.

The Mesozoic Flora of the United States, A Review. Ward, Lester F. Science, xiii., 904.

The Jurassic Flora of Great Britain. Seward, A. C. A Review. Amer. Nat., xxxv., 606.

PENHALLOW, D. P.
Address on the Progress of Fruit Culture in the Province of Quebec. Ann. Rept. Pom. Soc. of the Prov. of Quebec, 1900, 114.

The Wood-Pulp Industry of Canada. Montreal, March, 1902.

ROBINSON, CHARLES BUDD.
Early Intervale Flora of Eastern Nova Scotia. Trans. Nova Scotia Institute of Science, Vol. x., pp. 502—506. 1902, Halifax.

ROD AND GUN IN CANADA.
Nova Scotia Forests; an editorial article on W. A. Hendry's Report on the Forests of Nova Scotia to the N.S. Legislature, 1884, Vol. iv., No. 2, pp. 56—58. July, 1902, Montreal.

The White Spruce. Ibidem, pp. 19—20; and Reply to Criticism of the Forestry Bureau, Canada, pp. 24—26. June, 1902.

SAUNDERS, WILLIAM.
Further Experiments in Plant Breeding at the Experimental Farms. Trans. Roy. Soc., Can., 2nd Ser., Vol. viii., Sec. iv., pp. 115—123 (including 6 figures). Read 27th May, 1902, Ottawa.

VAN HORNE, MISS.
Some of the Mushrooms of Canada. Read 24th April, under auspices of Natural History Society of Montreal.

XII.—*Bibliography of Canadian Geology and Palæontology.*

By H. M. AMI, M.A., D.Sc., F.G.S.

Of the Geological Survey of Canada.

(Read May 19, 1903).

ADAMS, FRANK D., and JOHN T. NICHOLSON.

"An Experimental Investigation into the flow of Marble."
Canadian Record of Science, Vol. VIII., No. 7, pp. 426-436, January, 1902 (issued 7, III, 1902).

ADAMS, FRANK D.

(Geological Structure of the Monteregian Hills).
Science, United States, Vol. 15, No. 391, pp. 1009-1010. (June 27th, 1902) (New York) (Abstract of the paper read before the Royal Society, Canada. G. U. Hay.)

Geology of the "Haliburton and Bancroft Areas."
Summary Report of the Geological Survey, Canada, for 1901, pp. 145-148, issued April 15th, 1902, Ottawa.

AMI, HENRY M.

"On the possible occurrence of a Coal Area beneath the Neo-Carboniferous or Permian Strata of Pictou County, N.S." Canadian Min. Inst., read before Can. Min. Inst., March, 1902, 7 pp.

On Belinurus Kiltorkensis, Bailey.
American Geologist, Vol. 29, No. 3, p. 188, March, 1902, Minn.

"The Great St. Lawrence—Champlain—Appalachian Fault of America and some of the Geological problems connected with it."
Abstracts of Proc. Geological Society, London, No. 764, Session 1901-1902, pp. 129-130-131 (discussion), London, England, June, 1902.

"Artesian Wells, palæontology, archæology, bibliographies."
Summary Report Geological Survey of Canada, for 1901, pp. 258-265, Ottawa, Canada, April 15th, 1902.

"Brief description of the Map of the Ottawa district."
The Ottawa Naturalist, Vol. XVI, No. 9, pp. 187-189, December, 1902, Ottawa, Canada.

"Bibliography of Dr. George Dawson."
Canadian Record of Science, Vol. VIII, No. 8, pp. 503-516, July 1902, Montreal, Quebec.
Separate issue, December 17th, 1902.

"The Meso-Carboniferous age of the Union and Riversdale formations of Nova Scotia." Read before the Geological Society, America, Jan. 2nd, 1902. (Abstract.)
Science, Vol. XV, No. 368, p. 90, New York City, January 17th, 1902.

Notes on the Albany meeting of the Geological Society of America, held December, 1900.
Canadian Record of Science, Vol. VIII, No. 7, pp. 471-477. Jan. 1902.

AMI, H. M.

Annual Report of the Geological Section of the Ottawa Field Naturalist's Club, for the year 1901-1902. Addressed to the Council of the O.F.N.C. (Read January 14th, 1902.)

Ottawa Naturalist, Vol. XV, No. II, pp. 254-262, February 5th, 1902.

"The Union and Riversdale formations in Nova Scotia." (Discussion and correspondence.)

Science, N.S., Vol. XV, No. 375, p. 392, March 7th, 1902, New York City, N.Y., U.S.A.

The Cambrian age of the Dictyonema Slates of Nova Scotia.

Geological Magazine, Vol. 9, May, 1902, pp. 218-219, London, England.

Field-Notes on the Geology of the Country about Chelsea.

Ottawa Field Naturalists' Excursion, Chelsea, September 6th, 1902. Ottawa Naturalist, Vol. XVI, No. 7, pp. 149-151, October 6th, 1902, Ottawa, Canada.

Review of Whiteaves's "Catalogue of Marine Invertebrata of Eastern Canada. Geological Survey of Canada, 271 pp., No. 722, October, 1901, Ottawa." Geological Centralblatt, Leipzic, Bd. II., No. 21, pp. 729-730 1902.

"On the succession of Strata in Eastern Ontario." The Geological Society of America. Scientific American, Supplement No. 1360, Vol. LIII, p. 21798, January 25th, 1902, New York. Abstract of paper by E. O. Hovey.

Review of Dr. G. F. Matthew's paper, "Are the St. John plant beds Carboniferous?"

The Ottawa Naturalist, Vol. XV, No. 12, p. 286, March, 1902, Ottawa, Canada.

Appendix, Preliminary lists of the Organic remains occurring in the various Geological formations comprised in the Map of Ottawa District, including formations in the Provinces of Quebec and Ontario, along the Ottawa River, pp. 49G-77G.

Annual Report Geological Survey of Canada, Part G, Vol. XII (Appendix to Report, by R. W. Ells), No. 741.

The Ordovician Succession in Eastern Ontario. (Read before the Geological Society, America, Rochester, December 31st, 1901.

Science, Vol. XV, No. 368, New York, January 17th, 1902, p. 82 (Abstract.)

(With note on discussion, by Bailey Willis, W. M. Davis, and Hon. C. D. Walcott.) New York City.

BAILEY, L. W.

"New Brunswick."

Summary Report Geological Survey, Canada, for 1901, pp. 190-204, 1902 (Ap. 15), Ottawa, Canada.

"On some modes of occurrence of the Mineral Albertite."

Trans. Royal Society, Canada, 2nd series, Vol. VIII, Sect. 4, pp. 77-83, with plate, 6 figures. Received February 4th, 1902, marked 1901.

"On some Geological correlations in New Brunswick."

Trans. Royal Society, Canada, 2nd series, Vol. VII, pp. 143-150. marked 1901. Received at Ottawa, 24th February, 1902.

BARLOW, A. E.

"On the Nepheline rocks of Ice River, British Columbia."
Ottawa Naturalist, Vol. XVI, No. 3 (June, 1902), pp. 70-76, Ottawa, June, 1902.

Petrographical and microscopical characters and descriptions of rocks from Eastern shore of Lake Winnipeg.
Geological Survey of Canada, Annual Report, Vol. XI, pp. 26G-27G. To accompany Report of J. B. Tyrrell, East side of Lake Winnipeg, dated 1901. Ottawa. Issued 1902.

"The Sudbury District."
Summary Report of the Geological Survey, Canada, for 1901, pp. 141-145, April 15th, 1902, Ottawa, Canada.

"Dr. Alfred R. C. Selwyn, C.M.G., F.R.S., Director of the Geological Survey of Canada, 1869-1894." (Obituary notice with portrait.)
The Ottawa Naturalist, Vol. XVI, No. 9 (portrait), pp. 171-177, December, 1902, Ottawa, Canada.
(Separates distributed 20th December, 1902.)

BATHER, F. A.

A Record of, and an index to the Literature of Echinoderma published during the year 1901.

BELL, ROBERT.

Summary Report Geological Survey Department for 1901 (R. Bell, acting Director). 269 pages, Ottawa, Canada.
Reviewed by H. S. Williams in American Journal of Science, 4th series, Vol. XIII, No. 78, June, 1902, pp. 473-474, New Haven, Conn.

Map. Geological Map of the Dominion of Canada.
Western Sheet, No. 783, Scale 50 miles to the inch, Ottawa, 1902.

BLAKEMORE, W.

The iron ore deposits near Kitchener, British Columbia.
The Engineering and Mining Journal, Vol. LXXIII, No. II, pp. 382-383, March 15th, 1902, New York, United States. Read before the Canadian Mining Institute, March 6th, 1902.

BONNEY, T. G.

"A sodalite syenite from Ice River Valley, Canadian Rocky Mountains."
Geological Magazine, Vol. 9, May, 1902, pp. 199-205 (May), London, England.

BOYD, D. G.

Michipicoten Mining Division.
Eleventh Annual Report, Ontario Division of Mines, 1902, pp. 74-78, Toronto, Ontario. Printed by order of the Legislative Assembly of Ontario.

BREWER, WILLIAM M.

"Progress in Mining and Smelting." Boundary Mining District, British Columbia.
The Engineering and Mining Journal, Vol. LXXIII, No. 18, May 3rd, 1902, pp. 617-620. Illustrated by photo and diagrams.

BREWER, WILLIAM M.

Boundary Creek Mining District proper. "Mining and Smelting," British Columbia.

The Engineering and Mining Journal, 1902.

McKee Creek, Atlin Mining Division, British Columbia.

Engin. and Min. Journ., Vol. 73, No. 7, p. 243-3. Feb. 15th, 1902.

"Alberta Territory, Canada. Coal fields on Crow's Nest Pass Branch of the Canadian Pacific Railway."

Engin. and Mining Jour., Vol. 73, No. 22, p. 757-8. May 31, 1902.

BROCK, R. W.

The Boundary Creek District, British Columbia.

Summary Report, Canadian Geological Survey, 1901, pp. 46-67, April 15th, 1902, Ottawa, Ontario.

The Ore deposits of the Boundary District, British Columbia.

The Engineering and Mining Journal, Vol. 73, No. II, pp. 385-387, March 15th, 1902, New York City, New York. (Read before the Canadian Mining Institute, March 5th, 1902.)

BROOKS, WILLIAM.

"Notes from the Atlin District," British Columbia.

Engineering and Mining Journal, Vol. 74, No. 22, November 29th, 1902, pp. 707-708. (Illustrated.) New York City.

BROWN, R. M.

Gaspé Point; a type of cuspate foreland.

Journal, Geological, Vol. I, October, 1902, p. 343, 1902.

BUCHAN, JOHN S.

"Some notes on Mount Royal." Illustrated.

Canadian Record of Science, Vol. 8, No. 8, pp. 517-525, July, 1902, issued November, 1902, Montreal, Quebec.

CARTER, W. B. H.

The Mines of Ontario.

Eleventh Report Bureau of Mines for Ontario, pp. 231-298, 1902. Printed by order of the Legislative Assembly of Ontario.

CHALMERS, ROBERT.

"On borings for natural gas, petroleum and water, also notes on the surface geology of parts of Ontario."

Summary Report of the Geological Survey Dept. for 1901, pp. 158-169, April 15th, 1902, Ottawa, Canada.

COLEMAN, A. P.

Syenites from Port Coldwell.

Eleventh Report Bureau of Mines, Ontario, pp. 208-213, Toronto. Printed by order of the Legislative Assembly of Ontario.

"Iron ranges in North-western Ontario."

Eleventh Report of the Bureau of Mines, Ontario, 1902, p. 128-151, Toronto. Printed by order of the Legislative Assembly of Ontario.

The Huronian Question.

The American Geologist, Vol. 29, No. 6, June, 1902, pp. 325-334, Minn., U.S.A.

COLEMAN, A. P.

Nepheline and other Syenites near Port Coldwell, Ontario.
XVII, American Journal, Science, 4th series, Vol. XIV, No. 80, August, 1902, pp. 147-155, August, 1902, New Haven.

"The duration of the Toronto Interglacial period."
American Geologist, Vol. XXIX, No. 2, pp. 71-79, February, 1902, Minneapolis, Minn., U.S.A.

Rock Basins of Helen Mine, Michipicoten, Canada.
Bull. Geological Society, America, Vol. 13, pp. 293-304, pt. 45, figures 1 and 2, Rochester, New York. (Read before the Geological Society of America.) Rochester, December 31st, 1901.
Science, N. series, Vol. XV, No. 368, pp. 83-84, January 17th, 1902, New York City, N.Y., U.S.A.

Nepheline syenites and other syenites near Port Coldwell, Ontario.
American Journal of Science, Vol. 14, pp. 147-156, August, 1902, New Haven.

COLEMAN, A. P., and A. B. WILLMOTT.

"The Michipicoten Iron region."
Eleventh Report Bureau of Mines, Ontario, pp. 152-185, Toronto, Ontario.
Printed by order of the Legislative Assembly of Ontario.

Geological Map of Michipicoten Iron Range.
Eleventh Report of the Bureau of Mines for Ottawa, Ontario. Scale, 40 chains to 1 inch. Two sections and legend.

(COPE, E. D.)

"Catalogue chronologique des publications, par Persifor Frazer."
Annales de la Société Geologique de Belgique, Vol. 29, 77 pp, Liége, Belgique, 1902.

CROSBY, W. O.

"Origin and relations of the auriferous veins of Algoma (Western Ontario."
Technology Quarterly, Vol. XV, No. 2, June, 1901, pp. 161-180 (Abstracts from Prof. A. P. Coleman's Report.) Author's Edition. (See also Report Bureau of Mines.)

DALY, R. A.

"The Geology of the region adjoining the Western part of the International Boundary Line."
Summary Report of the Geological Survey Department for 1901, pp. 37-49, April 15th, 1902, Ottawa, Canada.

"The Geology of the North East Coast of Labrador."
Bull. Mus. Comp. Zoology at Harvard College, Vol. XXXVIII. Geological Series, Vol. V, No. 5, pp. 205-270, plates 1 to 11 (one to eleven), Cambridge, Mass., U.S.A., February, 1902.

DONALD, J. T.

The limestones of the Phillipsburgh Railway and Coal Company.
Engin. and Mining Journ., Vol. 73, No. 19, p. 657. May, 1902.

DOWLING, D. B.

The West side of James Bay.
Summary Report Geological Survey, Canada, for 1901, issued 1902, April 15th, 1902, pp. 107-115, Ottawa, Canada.

DRESSER, J. A.

"Petrography of Shefford and Brome Mountains."
Summary Report of the Geological Survey Department for 1901, pp. 183-187, April 15th, 1902, Ottawa, Ontario.

"A petrographical contribution to the Geology of the Eastern Townships of the Province of Quebec."
American Journal of Science, 4th series, Vol. XIII, No. 29, July, 1902, pp. 43-48 (1902) (Sketch Map.)

DUMAIS, P. H.

"Quelques aperçus sur la géologie du Saguenay."
La formatine du lac Saint John. Continué de la page 182, Vol. 27. Le Nat. Canadien, Vol. 29 (9e de la 2 serie), No. 10, Oct. 02, pp. 149-152, Quebec.

"Quelques aperçus sur la géologie du Saguenay."
Le Nat. Canadien, Vol. XXIX (IX de la 2nd serie), No. II, Novembre, 1902, Quebec, pp. 172-175.

ELLIS, W. H. (Prof.)

"Analysis of Anthraxolite from Hudson's Bay."
Science, U.S., No. 391, p. 1014, abstract (¼ p.) Sample brought by G. R. Meikle, Long Island, Hudson's Bay.

ELLS, R. W.

"The Carboniferous Basin in New Brunswick."
Trans. Royal Society, Canada, 2nd series, 1901-1902, Vol. VII, section IV, Ottawa, Canada, pp. 45-56. Read May 23rd, 1901.

"Notes on the geology of Minas Basin."
"Acadia Athenæum," Vol. XXVIII, No. 4, pp. 153-162, February, 1902, Wolfville, Nova Scotia.

"The district around Kingston, Ontario."
Summary Report Geological Survey Department for 1901, pp. 170-183, Ottawa, Canada.

"Marl deposits in Ontario, Quebec, New Brunswick and Nova Scotia."
The Ottawa Naturalist, Vol. XVI, pp. 59-69, June 3rd, 1902, Ottawa, Canada. Separates.

FARIBAULT, E. R.

Nova Scotia Gold Fields.
Summary Report Geological Survey Department for 1901, pp. 214-221, April 15, 1902, Ottawa, Canada.

FLETCHER, HUGH.

"Kings and Hants Counties, Nova Scotia."
Summary Report Geological Survey Department for 1901, pp. 208-214, with map, April 15th, 1902, Ottawa, Canada.

FRAZER, PERSIFOR.

Catalogue chronologique des publications de Edward Drinker Cope, professeur de géologie de l'Université de Pennsylvanie de 1850 à 1897.

Annales Soc. Geol. Belgique, Vol. 29, Liege, 1902.

GEOLOGICAL SURVEY DEPARTMENT.

Summary Report Geological Survey Department for the year 1901, pp. 269, 13 sketch maps.

(R. Bell, acting Director and staff.) Printed by order of Parliament, April 15th, 1902.

GIBSON, THOMAS W.

Eleventh Report of the Bureau of Mines, Ontario, 1902, pp. 309. Maps, Toronto, Canada, 1902 (pp. 9-61.)

GILPIN, EDWARD, Jr.

Report on the Mines of Nova Scotia.

Report Department of Mines for the year ending September, 1901, pp. 87, and XXXI, Halifax, Nova Scotia, 1902.

GRANT, C. C., Col.

"Geological Notes" (continued.)

Journ. and Proc. Hamilton Association, Session 1901-1902, No. XVIII, pp. 48-52. Preceded on pp. 46-47, and followed on p. 53 by three plates of fossils?

Coral Reefs, Modern and Ancient.

Journal and Proc. Hamilton Association, Session 1901-1902, No. XVIII, pp. 43-45, 1902, Hamilton, Ontario.

"Opening Address, Geological Section for Session, 1901-1902."

Journ. and Proc. Hamilton Scientific Assoc., Session 1901-1902, No. XVIII, pp. 33-42, Hamilton, Ontario, November, 1902.

"Evolution *vs.* the fall of Man."

Journ. and Proc. Hamilton Association, Session 1901-1902, Vol. XVII, pp. 62-67, Hamilton, Ontario, November, 1902. Ethnological.

GROOM, PROF. T.

"The Great St. Lawrence-Champlain-Appalachian Fault and some of the Geological Problems connected with it."

Proc. Geological Society, London, No. 764, Session 1901-02, p. 131, London, June, 1902. (Abstract.)

GRABAU, A. W.

Spirifer mucronatus and its derivatives. (Read before the Geol. Society, America, Pittsburg, Pa., June, 1902.)

Noticed in American Geologist, Vol. 30, p. 134, August, 1902.

GRABAU, A. W., and HERVEY W. SHIMER.

Hamilton Group of Thedford, Ontario.

Bulletin of the Geological Society of America, Vol. 13, pp. 149-186, August, 1902, Rochester, New York, U.S.A.

"Stratigraphical and Faunal succession in the Hamilton Group of Thedford, Ontario." (Read before the Geological Society of America, December 31st, 1901, Rochester, New York.)

Science, U.S., Vol. XV, No. 368, pp. 82-83, January 17th, 1902, New York City, MacMillan & Co.

MARINE BIOLOGICAL WOODS HOLE LIBRARY

GWILLIM, J. C.

Glaciation in the Atlin district, British Columbia.
Journal Geology, Vol. 10, pp. 182-185, February, March, 1902.

"North Thompson River and Tête Jaune Cache District."
The British Columbia Mining Record, Vol. IX, No. 1, pp. 26-28 (illustrated), January, 1902, Victoria, British Columbia.

HARRINGTON, B. J.

"George Mercer Dawson" (with portrait). Biographical sketch.
Canadian Record of Science, Vol. VIII, No. 7, pp. 413-425, January, 1902 (issued March, 1902.)

HAY, G. U.

Section of the Geological and Biological Sciences, Royal Society of Canada.
Science, U.S., Vol. 15, No. 391, pp. 1009-1012, June 27th, 1902.

HAYCOCK, ERNEST.

Fossils, possibly Triassic in the Glaciated fragments in the boulder clay of King's County, N.S. Rec.'d for pub., December 18th, 1901.
Trans. Nova Scotian Institute of Science, pp. 376-378, June, 1902.

"The Geological History of the Gaspereau Valley."
Trans. Nova Scotia Work of Science, Vol. X, pp. 361-375. (Rec.'d for publication, December 18th, 1901.) Issued from press, and distributed June, 1902. Plate VII.

HOFFMANN, G. C.

"Chemistry and Mineralogy."
Summary Report of the Geological Survey Department for 1901, pp. 230-239, April, 1902, Ottawa, Canada.

"Occurrence of Chrompicolite in Canada."
American Journal of Science, Vol. XIII, March, 1902, pp. 242-243, New Haven, 1902.

HOVEY, E. O., and R. P. WHITFIELD.

Catalogue of the types and figures, specimens, in the palæontological collections of the Geological Department, American Museum of Natural History.
Vol. XI, Bull. American Museum of Natural History, pp. 1-500, 1898-99-1901-02. Refers to numerous types from Canada.

INGALL, E. D.

"The progress of mining in Canada."
Summary Report Geological Survey Department for 1901, pp. 239-244, April 15th, 1902, Ottawa, Canada.

JOHNSTON, J. F. E.

"Eastern part of the Abitibi region."
Summary Report of the Geological Survey Department for 1901, pp. 128-141; map. April 15th, 1902, Ottawa, Canada.

KAIN, S. W.

Report on archæology.
Bull. Natural History Society, New Brunswick, No. XX, pp. 494-495, 1902, St. John, New Brunswick.

KEILHACK, K.

Geologisches Centralblatt.

Bd. II, No. 18, pp. 545-546, 568-569. Reviews of papers, by Dresser, Whiteaves.

LAFLAMME, PROF. J. C. K.

"Geological Explorations of Anticosti."

Summary Report Geological Survey Department for 1901, pp. 188-194, April 15th, 1902, Ottawa, Canada.

LAMBE, L. M.

Red Deer river, Alberta, with palæontological paper added on Trionyx foveatus, Leidy and Trionyx vagans, Cope, from the Cretaceous Rocks of Alberta (with four plates.)

Summary Report of the Geological Survey Department for 1901, pp. 80-85, pls. I-IV, 1902, Ottawa, Canada.

New Genera and species from the Belly River series (Mid-Cretaceous.)

Geological Survey, Canada, Contribution to the Can. Pal., Vol. III, pp. 25-81, plates 4 to 20, 1902, Ottawa, Canada.

New Genera and species from the Belly River series (Mid-Cretaceous.)

Geological Survey, Canada, Contribution to the Can. Pal., Vol. III (Quarto) Pt. 2. On Vertebrata of the Mid-Cretaceous of the North West Territory, pp. 25-81, 21 plates. Issued 18th September, 1902.

(LAMBE, L. M.) review.

"A review of the genera and species of Canadian palæozoic corals."

Canadian Record of Science, Vol. 8, No. 7, pp. 499-500, January, 1902, issued March 7th, 1902, by Rev. Dr. R. Campbell.

LAPWORTH, CHARLES.

"The Great St. Lawrence-Champlain-Appalachian Fault and some of the Geological problems connected with it" (discussion.)

Proc. Geol. Soc., London, No. 764, pp. 130-131, June, 1902, London, England.

LEACH, W. W.

"Crows Nest Coal Field."

Summary Report Geological Survey Department for 1901, pp. 67-79, April 15th, 1902, Ottawa, Canada.

MATTHEW, G. F., REVIEW OF WORK BY.

"Hyolithes gracilis and related forms from the lower Cambrian of the St. John Group."

Trans. Royal Society, Canada, 2nd series, Vol. VII, section 4, pp. 109-111 (1901). Issued March, 1902, received at Ottawa, March 30th, 1902.)

"Studies in Cambrian faunas of Eastern Canada."

Science, N.S., No. 391, Vol. XV, pp. 1010-1011 (June 27th, '02), New York City. (Abstract by G. U. Hay.) Inserted between 466-469.

MATTHEWS, G. F.

"Cambrian Rocks and fossils of Cape Breton."
Summary Report Geological Survey Dept. for 1901 (April 15th, 1902), pp. 221-230, Ottawa, Canada.

"Ostracoda of the basal Cambrian Rocks in Cape Breton."
Canadian Record of Science, Vol. VIII, No. 7, for January, 1902, issued February, 1902, Montreal, pp. 437-468, two plates, inserted between pp. 466-469.

"Additional notes on the Cambrian of Cape Breton with descriptions of new species."
Bulletin of Natural History, N.S., No. XX, Vol. IV, pt. 5, pp. 377-425, 5 plates.
Reviewed anonymously in American Journal Science, Vol. 13, No. 76, April, 1902, New Haven, p. 324.

"Additional Notes on the Cambrian of Cape Breton."
Bull. Nat. Hist. Soc., N. Br. Can., No. XX, Vol. IV, part V, St. John, N. Br., pp. 377-425 (one table facing p. 379, one page of errata, plates 13-18, January, 1902.

(Die Geographische Verbreitang and Entwickelung des Cambrian, von Fritz Frech, Breslau.)
Review of Recent Geological Literature, Amer. Geol., Vol. 29, No. 2, pp. 117-119, February, 1902, Minneapolis, Minn., U.S.A.

(Ueber die Borkholmer Schicht in Silurgibiet von Carl Wiman). Bull. Geol. Inst. Upsala, No. 10, Vol. V, pt. 2, 1900.
See Review of Recent Geological Literature, Amer. Geol., Vol. 29, No. 2, 1902, February, Minneapolis, Minn., U.S.A.

"Stratigraphy versus Paleontology in Nova Scotia." (Discussion and Correspondence.)
Science, N.S., Vol. XVI, No. 404, pp. 513-514, 1902, September 20th.

"A backward step in palæobotany."
Trans. Roy. Soc., Can., 2nd series, Vol. VII, Sect. IV, pp. 113-122, 1902. Named 1902. (Issued March, 1902.)

Review of Bidrag till Kanna domen om Trilobibernas Byggnad af. Job. Chr. Moberg. (Aftryck ur Geol. forent Stockholm, forhandl. Bd. 24, H. 5, 1902.)
Amer. Geol., Vol. XXX, p. 390, 1902.

MATTHEW, W. D.

"The skull of Hypisodus, the smallest of the artiodactyla with a revision of the Hypertragulidæ.
Bull. Amer. Mus. Nat. Hist., Vol. 16, Art. 23, pp. 311-316, September 25th, New York City, 1902.

MCCONNELL, R. G.

"The Yukon District."
Summary Report Geological Survey Department for 1901, pp. 23-37, April 16th, 1902, Ottawa, Canada.

"Note on the so-called basal granite of the Yukon Valley."
Amer. Geol., Vol. 30, No. 1, pp. 55-62, July, 1902, Minneapolis, Minn., U.S.A.

McEvoy, J.

"Geological and Topographical Map of the Crows Nest Coal Fields, East Kootenay District, B.C." Scale 2 miles to one inch. Geological Survey of Canada.

Issued November 7th, 1902, Ottawa. Printed by order of Parliament.

Meissner, C. A.

"Some of the pyrites deposits at Port au Port, Newfoundland."

"The Engineering and Mining Journal, Vol. 73, No. 18, pp. 626-627. With map (May 3, 1902) New York.

Mendenhall, W. C.

The Outlook in the Klondyke.

The Engineering and Mining Journal, Vol. 73, No. 18, p. 615, May 3rd, 1902, New York City.

Miller, W. G.

"The Eastern Ontario Gold Belt."

Eleventh Report of the Bureau of Mines, Ontario, pp. 186-207, 1902, Toronto, Ontario. Printed by order of the Legislative Assembly of Ontario.

Outline Map of the Eastern Ontario Gold Belt. To accompany Report of W. G. Miller.

Eleventh Report of the Bureau of Mines, 1902. Scale, 4 miles to 1 inch.

"Lake Temiscaming to Height of Land."

Eleventh Report Bureau of Mines, Ontario, 1902, pp. 214-230, Toronto, Ontario. Printed by order of the Legislative Assembly of Ontario.

Nattress, Thos. (with determinations by J. F. Whiteaves).

"The Corniferous exposure in Anderdon."

Eleventh Report Bureau of Mines, Ontario, pp. 123-127, 1902, Toronto. Printed by order of the Legislative Assembly of Ontario.

Obalski, J.

Mining operations on the Province of Quebec for the year 1901. Forming part of the Ann. Report, Dept. Lands, Mines and Fisheries, for fiscal year 1900-1901, Quebec, 1902, 47 pages.

Osann, A.

"Notes on certain Archæan rocks of the Ottawa Valley."

(Transl. by N. N. Evans.) Geol. Surv. Canada, No. 763, Part O. Ann. Rep., Vol. XII, 84 pages, 11 plates, Ottawa, 1902.

Osborn, H. F.

"Distinctive characters of the Mid-Cretaceous fauna."

Geol. Surv., Canada, Contrib. to the Can. Pal., Vol. III (quarto), pt. II, on investigation of the Mid-Cretaceous of the North West Territory, by H. F. Osborn and L. M. Lambe, 21 pages (issued September 18th, 1902), Ottawa.

PARKS, W. A.

"The Country East of Nipigon Lake and River."

Summary Report Geological Survey Department for 1901, pp. 103-107, April 15th, 1902, Ottawa, Ontario.

PENHALLOW, D. P.

(Cretaceous and Tertiary Plants of Canada.) (Abstract.)

Science, N.S., Vol. 15, No. 391, pp. 1011, June 27th, 1902. In Rep. of Proc. Royl. Soc., Can. (Toronto Meeting, 1902, by G. U. Hay.)

POOLE, H. S.

"The Coal Problem in New Brunswick."

Summary Report Geol. Surv. Dept. for 1901, pp. 204-206, April 15th, 1902, Ottawa, Canada. Printed by order of Parliament.

PRESTON, H. L.

"Niagara Meteorite."

Journ. Geol., Vol. X, pp. 518-520, July-August, 1902.

REID, HARRY FIELDING.

The variations of Glaciers, VII.

Journ. of Geol., Vol. 10, No. 3, pp. 313-317, Canada, p. 315-316, April-May, 1902.

Previous References.

I.—Ib., Vol. III, pp. 278-288, Canada.
II.—Ib., Vol. V, pp. 378-383, Canada.
III.—Ib., Vol. VI, pp. 473-476, Canada.
IV.—Ib., Vol. VII, pp. 217-225, Canada.
V.—Ib., Vol. VIII, pp. 154-159, Canada.
VI.—Ib., Vol. IX, pp. 250-254, Canada.

RIES, HEINRICH.

"Analyses of red felspar from Bedford, Ontario, Canada."

U.S. Geol. Surv. The production of flint and felspar in 1901. Extr. from Mining Resources of U.S. for 1901, D. T. Day, Washington, 1902, p. 8, (½ p.).

SOMERSFELETT, E.

Review of Report, by J. McEvoy, on Geol. and Nat. Res. of Country. (Crow's Nest Coal-Fields.)

Neues Jahrbuch für Min. Geol. und Pal., p. 430 (½ p.) I Band, Drittes Heft, May, 1902.

SCHUCHERT, CHARLES.

Palæozoic seas and barriers in Eastern North America.

Report N.Y. State Palæontologist, 1901, p. 633-663, maps and illustrations, July, 1902, Albany, New York.

(SELWYN, ALFRED R. C.)

Biographical sketch of "Dr. Alfred R. C. Selwyn, C.M.G., F.R.S., Director of the Geological Survey of Canada, 1869-1894," by Dr. A. E. Barlow, Ottawa, with portrait.

Ottawa Naturalist, Vol. XVI, No. 9, pp. 171-177, December, 1902, Ottawa, Canada.

(SELWYN, ALFRED R. C.)

Obituary Notice. (Anonymous.)

Canadian Mining Review, Vol. 21, No. XI, November 30th, 1902, Ottawa, pp. 265-266 (portrait.)

SENECAL, C. O.

"Mapping and Engraving."

Summary Report Geological Survey Dept. for 1901, pp. 244-251, April 15th, 1902, Ottawa, Canada.

SHIMER, H. W., and A. W. GRABAU.

"Stratigraphical and Faunal Succession in the Hamilton Group of Thedford, Ontario. (Read before the Geol. Soc. of Amer., December 31st, 1901) Rochester, N.Y.

Science, N.S., Vol. XV, No. 368, pp. 82-83, January 17th, 1902 (abstract), New York City.

"Hamilton Group of Thedford, Ontario."

Bull. Geol. Society, Amer., Vol. 13, pp. 149-186, August, 1902, Rochester, New York, U.S.A.

SHUTT, F. T.

Report of the chemist.

Central Experimental Farm, Dept. of Agriculture. Ann. Report Exp. Farms, for 1901, pp. 153-155, reference to Ottawa, Ontario. Printed by order of Parliament, 1902.

SPENCER, ARTHUR C.

"The Pacific Mountain System in British Columbia and Alaska." (Read before the Geol. Soc. of Amer., at the Pittsburg Meeting, June, 1902.)

Noticed: Amer. Journ., Vol. 30, pp. 133, August, 1902.

"The Pacific Mountain System of British Columbia and Alaska."

Science, Vol. 16, p. 261, August 15th, 1902.

SPENCER, J. W.

"The Windward Islands of the West Indies." (Read, 2nd Nov., 1901.)

Trans. Can. Int., No. 14, October, 1902, Vol. VII, Part 2, 1902, Toronto, Ontario, pp. 351-370. With eight plates, six map charts, and illustrations.

TEALL, J. J. H., and H. B. W.

"Dr. George Mercer Dawson (Obituary Notice.)

Anniversary Address of the President, Vol. 58, pp. 55, 1902.

THATCHER, J. B.

A correction of Prof. Osborn's note entitled, "New Vertebrates of the Mid-Cretaceous."

Science, Vol. 16, No. 21, 1902.

TRISTRAM, REV. CANON H. B.

"The Cahowe of the Bermudas."

Ann. and Mag. Nat. Hist., 7th series, Vol. 9, No. 54, pp. 447-448, June, 1902.

ULRICH, E. O., and CHARLES SCHUCHERT.

Palæozoic seas and barriers in Eastern North America.
Rep., N.Y., State Geologist, for 1901, pp. 633-663, Albany, N.Y., July, 1902.

VERRILL, A. E.

"The 'Cahow' of the Bermudas," an extinct bird.
Ann. Mag. of Nat. Hist., January, 1902, 7th series, Vol. 9, No. 49, pp. 26-31, London, 1902.

WALCOTT, C. D.

Outlook of the Geologist in America.
Bull. Geol. Soc., Amer., Vol. 13, pp. 99-118, February, 1902. (Rec.'d at Ottawa, 28-3-1902), Rochester, N.Y., references to Canadian Work. See also T. O. Hovey's notice in Engin. and Min. Journ., N.Y. City, 1902.

WALKER, A. E.

"Obituary."
Journ. and Proc., Hamilton, Session 1901-02, No. XVIII, p. 118 (portrait), November, 1902, Hamilton, Ontario.

WEATHERBEE, D'ARCY.

"Memorandum of boring operations with the Government drills. Boring Machines."
Report of the Dept. of Mines, Nova Scotia, for the year ending, 30th September, 1901, pp. 73-76, Halifax, N.S.

WELLS, J. W.

"Arsenic in Ontario."
Eleventh Report of the Bureau of Mines, Ontario, pp. 101-122, 1902, Toronto, Ontario. Printed by order of the Legislative Assembly of Ontario.

WHITE, DAVID.

"Stratigraphy versus Palæontology."
Science, Vol. 16, p. 232, August 8th, 1902.

"Stratigraphy versus Palæontology in Nova Scotia."
Science, N.S., Vol. XVI, No. 397, pp. 232-235, August 8th, 1902, New York City.

WHITEAVES, J. F.

"On the Genus *Panenka*, Barrande, with a description of a second species of that genus from the Devonian Rocks of Ontario."
Ottawa Nat., Vol. XV, No. 12, pp. 263-265, March 8th, 1902, Ottawa, Canada. (Separates issued March 10th, 1902).

"Review of Cat. of Marine Invertebrata of Eastern Canada."
Ann. and Mag. Nat. Hist., 7th series, Vol. 9, No. 50, p. 156, London, England, 1902.

"Palæontology and Zoology."
Summary Report Geol. Surv. Dept. for 1901. Printed by order of Parliament, April 15th, 1902, pp. 251-258, Ottawa, Ontario.

WHITEAVES, J. F.

"On the Genus Trimerella, with descriptions of two supposed new species of that genus from the Silurian rocks of Keewatin" (with two plates.)

The Ottawa Nat., Vol. XVI, No. 7, pp. 139-143, October, 1902, pt. 1.

WHITFIELD, R. P., and E. O. HOVEY.

"Catalogue of the types and figured specimens in the Palæontological collection of the Geological Department, Amer. Mus. Nat. Hist."

Vol. XI, Bull. Ann. Mus. Nat. Hist., Vol. XI, pp. 1-500, 1901.

Numerous Canadian species listed.

WILCOX, W. D.

"Recent explorations in the Canadian Rockies."

National Geogr. Mag., Vol. 13, pp. 141-168, May, 1902. Issued in June, 1902.

WILLIAMS, H. S.

Correlation papers. "Fossil faunas and their use in correlating geological formations."

Amer. Journ. Sc., 4 ser., Vol. 13, No. 78, June, 1902.

WILLMOTT, A. B.

"The nomenclature of Lake Superior formations."

Journ. of Geology, Vol. X, No. 1, January-February, 1902, March, 1902, pp. 67-76.

"The mineral industries of Sault Ste. Marie."

Eleventh Report Bureau of Mines for Ontario, pp. 91-100, Toronto. Printed by order of the Legislative Assembly of Ontario.

"The Michipicoten Iron region."

Eleventh Report Bureau of Mines, Ontario, 1902, pp. 152-185, Toronto. Printed by order of the Legislative Assembly of Ontario.

Map of the Helen Mine. Scale 300 ft. to 1 inch.

To accompany Eleventh Report of the Bureau of Mines, 1902

Hypothetical sections along west boundary of Helen Claim. Scale, 600 ft. to 1 inch.

WILSON, DR. ALFRED W. G.

"Some recent folds in the Lorraine shales." Illustrated, 4 plates, 1 figure.

Can. Rec. Sc., Vol. 8, No. 8, pp. 525-531, July, 1902. Issued, November, 1902, Montreal, Quebec.

"The Country West of Nipigon Lake and River."

Summary Report Geol. Surv. Dept. for 1901, pp. 94-103, April, 1902, Ottawa, Canada. Printed by order of Parliament.

WILSON, W. J.

"Western Part of the Abitibi region."

Summary Report Geol. Surv. Dept. for 1901, pp. 115-128, Ottawa, Canada, April 15th, 1902.

WINCHELL, N. H. (Review.)

Review of Summary Report Geol. Surv. Dept. for 1901, Ottawa (April 15th, 1902), pp. 269, 13 sketch maps.

Amer. Geol., Vol. 30, No. 1, pp. 64-65, July, 1902.

"The Sutton Mountain." (Editorial comment.)

Amer. Geol., Vol. XXX, No. 2, pp. 118-120, August, 1902. Maintains view that rocks of Sutton are Archæan.

WOODWARD, HENRY.

"The Canadian Rockies, pt. 1. On a collection of Middle Cambrian fossils obtained by Edward Whymper, Esq., F.R.G.S., from Mount Stephen, British Columbia."

Geol. Mag., N.S., December 4th, No. 462, Vol. 9, No. 13, December, 1902, pp. 529-544, December, 1902.

"The Canadian Rockies, pt. 2. On a collection of Middle Cambrian fossils obtained by Edward Whymper, Esq., F.R.G.S., from Mount Stephen, British Columbia."

Geo. Mag., N.S., December 4th, No. 461, Vol. IX, pp. 502-505, November, 1902.

WRIGHT, G. F.

The rate of lateral erosion at Niagara.

Amer. Geol., Vol. 29, pp. 140-143, March, 1902. Minneapolis, Minn.

WRIGHT, JOSEPH.

"On the Marine fauna of the boulder clay." (Read before the Brit. Amer. Adr. Sc., Sect. C., Geology, September, 1902, Belfast meeting.

Geol. Mag., N.S., No. 461, pp. 518-519, December 4th, Vol. IX, No. XI, November, 1902, London, England.

XIII.—*Some Aspects of the Development of Comparative Psychology.*

By WESLEY MILLS, M.A., M.D., Etc.

Professor of Physiology in McGill University, Montreal, Canada.

(Read May 19, 1903.)

It is probably most satisfactory in every way if an address is to be general, that it shall have its foundation in the line of research which has most engaged the author for a number of years past. In harmony with this principle it was open to me to choose some subject bearing either on the anatomy and physiology of the nervous system, or one dealing with animal intelligence. To have treated the former in a way satisfactory to myself, would have implied considerable illustration and the use of the lantern, which could likely not be carried out without breaking in on an evening, and that was more than I cared to ask the section to do. Hence the selection of—Some Aspects of the Development of Animal Intelligence, as the topic of this address, the treatment of which must, in the nature of the case be incomplete.

It is no doubt true that man is more dependent on his environment than any other animal, if we restrict that term to the material world about us, but the very expression "Every man is the product of his age," conveys the truth that the greatest genius can get only so far beyond the average thought of his time. As Darwin long ago pointed out, the most important factor in man's environment is man himself. One has scarcely emerged from infancy before the accumulated forces of the ages in human traditions and knowledge begin to mould the developing human being, and determine what he shall be. So that, be as independent and original as anyone may, he is still in a sense a product of his environment. Of anything analogous to this among the lower animals there is little, consequently in taking account of the state of comparative psychology as it is to-day, and the steps by which it has been brought to its present development, one cannot for a moment lose sight of the general trend of thought and the whole sum of forces that we term environment. If it be a fact, as it is, that men to-day regard animals in a wholly different light from that of the Middle Ages and long after, it is because our general philosophy of life and our point of view have greatly changed.

Art is in an especial way the reflection of the thought and feeling of the time, and one cannot but know the indifference with which the old masters treated nature and especially animals; they were with them

simply objects in most instances to fill in a scene, either in the foreground, or more frequently the background. Man was with them, as with the masses of the people, the centre in this mundane universe; and all things had to be represented as correspondingly subordinated to him. It was only comparatively recently that animals were painted, simply because they were animals and not the mere servants or playthings of man. It is impossible to conceive of a Landseer in the age of Dante, and one is not greatly surprised that even so eminent a philosopher as Descartes should have regarded animals merely as automata. Not a few in this room can remember the time when with the masses the attitude towards the dog might be summed up in the question, What good is he? The idea that a dog might be a creature worthy of serious study with a view of ascertaining his place in the psychological scale, certainly did not enter into the minds of men generally prior to Darwin. But that great transformer, the doctrine of organic evolution, has wrought wonders for psychology as well as biology. When man conceived of the world as developing, rather than as completed, the whole attitude of the reflecting animal man was changed.

It is absolutely impossible to understand the rapidity of the progress of comparative psychology, or even the change of front, within so short a period as twenty years, without bearing in mind this cardinal fact. How truly incomprehensible to most scientists even must have been fifty years ago, such a problem as that which has attracted the attention of some of the best biologists and psychologists of late, namely, the degree to which consciousness extends back and down into the lower strata of the animal kingdom. It is now even asked why we should deny all glimmerings of consciousness to plants, even whether there is not a nexus between the animate and the inanimate of a kind more intimate than we have supposed. Even after men began to concede that animals were more than mere living machines worked by their senses—if they even gave enough attention to the subject to get that far—it was some time before intelligent people got beyond "instinct," the rough-and-ready cant phrase with which to place an animal in a classification that separated it immeasurably from man. People hardly conceived of man as a creature with as many instincts as the brutes. Rapidly, however, of late have the masses begun to realize that not instinct alone but intelligence must be invoked to explain animals. As a natural consequence of this change—this preparation of the soil of the human mind to receive new ideas—there came a wave of enthusiasm which led some of those who were naturally lovers of animals, and also serious students of the nature of their inner life to go too far—to attempt to explain the animal too fully by the man, to read

into him all that characterized the creature of the highest intelligence. However, this is, on the whole, scarcely to be regretted, for interest was through this sympathetic bond awakened and prepared the way for that critical investigation of animal psychology, which at an earlier period would have been premature.

Naturalists at a time prior to what may be termed the laboratory period, had noted the habits of animals with loving interest, but had not subjected them to a very critical analysis, and certainly had scarcely dreamt of correlating the mental life of even the highest groups of animals with that of man. Darwin had set the example of investigating the mental life of animals and of man by the same method of close observation. A study of his dog and his child were to him of equal interest scientifically, and his records remain among the most valuable of their kind to this day.

Sir John Lubbock soon followed after with admirable studies of insects. Huxley remained the critic, and his attitude in regard to animal intelligence, is one of the features of that great man's mental character not readily understood. To think that so pronounced an evolutionist should have held views not greatly different from those of Descartes, is truly surprising. Lubbock had worthy fellow-workers in McCook, Forel, the Peckhams and others. Probably no man did more, in Great Britain at all events, to stimulate the interest not only of scientists, but that large body of people who read to a greater or less extent the more popular of the scientific journals, than Romanes. He was in a position to devote much time to the subject, and his numerous letters and the replies they called forth in "Nature," have been among the most telling influences of our own time in advancing this subject. He has embodied his views in works, that in spite of all the destructive criticism of the last half dozen years, remain valuable both as storehouses of fact and examples of helpful critical analysis.

Within at the most ten years another great change has taken place. The biologists began to be more accurate, systematic and comparative in their observations, and most important of all, a different class of thinkers entered the field. If the biologists can be compared to the spearmen or the axemen of the army, the psychologists are the bowmen. They brought to the task, at all events, more skill in mental analysis and perhaps a clearer comprehension of the problems to be solved. They were, moreover, better prepared to correlate the data of animal and human psychology and find what was common to both, as well as draw sharp lines of distinction, if indeed, such lines can be drawn. If, on the one hand, the naturalists had been spasmodic, unsystematic and rather loose in their contributions and superficial in their analyses, the psychologists showed a tendency to substitute words and definitions for

realities. Arm-chair animal psychology has no doubt been evolved from insufficient data—an affair of words rather than of things—nevertheless great good has resulted for all, as we have been brought to what may be termed the experimental and critical age of comparative psychology.

It was most fortunate, that as successor to Romanes in Great Britain, the subject should have been taken up by a man so thoroughly prepared for his task as Lloyd Morgan, who is at once a biologist, a psychologist and a master of the pen. His works, in spite of the critical acumen they show, can be read by anyone with a moderate knowledge of biology and a sympathy with the subject of animal intelligence. And that has given them a wide circulation, a most important matter for the education of large numbers of persons to broader and truer views of the relations of man and his fellow-creatures. This is surely of the utmost importance, if we are to look to a right mental attitude as of more to man than food and raiment.

Still later we see a rise within a very few years of a class of investigators, that I presume would prefer to be called the experimental school, but whom I shall designate the laboratory school and the individuals the laborators, for I do not grant that they were the first experimenters. Their researches have practically all been such as can be readily carried out in the laboratory, a fact which explains at once to a large extent, their excellencies and their defects, especially the latter. This school has, on the whole, been destructive. If it has on the one hand brought few bricks to the pile, it has on the other boldly attempted to overturn some edifices that were relatively of ancient date and regarded by many with considerable respect. The most extreme representatives of this school deny to animals, not only reasoning and every form of intelligence proper, but even imitation and memory. The whole psychic life of animals not to be explained by instinct, was for them the result of the operation of the law of association of ideas; all else was illusion and delusion; previous workers were regarded as prejudiced in favour of animals; they were adjudged to have written as if they held a brief for animals as creatures that mentally were very like man, differing not so much in qualities as in the degree to which they were developed.

All this is wrong, utterly wrong, according to this very modern school, and claiming that anecdotes were rather misleading than helpful, that observations were of little value at the best, it was maintained that there had really, up till then, been no experiments worthy of the name, and that now, for the first time, was there something to be presented on which reliance might be placed, in spite of the fact that some, at all events, of the experimenters had neither biological

knowledge nor special experience of any kind with animals, and were plainly prejudiced at the outset against the views that the common sense of mankind, as well as the consensus of opinion among naturalists had held to be worthy of consideration. One of this school, perhaps to be considered the leader, claimed that with his method one only needed "a pair of eyes." This experimenter proceeded to place cats in cages 20 inches long, 15 broad and 12 high, and because they did not, under the stimulus of hunger, speedily manipulate certain mechanisms successfully he, on this and similar evidence, employing also dogs and other animals, proceeds to demolish in very summary fashion, the fundamental conclusions of hosts of observers who had several of them occupied many years in their tasks. Some of these conclusions seemed to be absolutely against common sense. Here we had, indeed, a violent reaction against that excess of credulity, which it must be confessed had existed, and it again was the natural reaction against that indifference to animals which had characterized preceding ages.

As the experimental methods of the laborators are now attracting so much attention, it will be worth while to examine them a little more fully. I elsewhere criticised, some four years ago, the methods and conclusions of the chief agnostic of this school, Dr. Thorndike, and I see now no reason to change the opinions I then expressed. Indeed, since that time the experience, and I may add the failures of others working along the same lines, have only strengthened the force of my convictions.

Mr. L. T. Hobhouse made a number of experiments on the dog, the cat, the monkey, the elephant and the otter. In the main these tests were carried out under conditions somewhat more natural than those of the experimenters of the school in question, but still they do not differ sufficiently to free them from the force of the objections which may be urged against all such ways of determining the nature of animal intelligence. Nevertheless, Mr. Hobhouse, using similar methods, came to very different conclusions from Dr. Thorndike, so that it would appear that something more than "a pair of eyes" is necessary for the solutions of the problems of animal psychology. Mr. Hobhouse from all his experiments and a critical examination of those of others, together with the weighing of the evidence afforded by the most extended and accurate series of consecutive observations on mammals available, came to the conclusion that "on their own lines and in their own way, some of the more understood mammals have powers equivalent to those of the ape." He also in criticism of the experimental method says, "so a dog may show not merely highly developed hunting instincts, but real cleverness in the adaptation of past

experience when it is a question of catching a hare, but he may be also an intolerable dullard about opening a box." Herein lies a great truth which the experimenters have failed in general to note. No animal and no man is equal to his fellows in all respects, and we know that some very able men, some men of undoubted genius, are exceedingly slow in certain directions.

To test an animal's intelligence by mechanisms, seems to be about on a par with gauging the nature of a man's intellect by certain "puzzles" in which, as is well-known, many able men are indeed "intolerable dullards." A set of experiments better adapted for the examination of the intelligence of the group in question, white rats, was that of Mr. Small. He used a maze, which was so arranged that when the animal secured the food that was put in the central portion, he was free from the maze and could return to his cage. The shortest path to the food was 105 feet, and there were 27 corners to be turned. It is a very noteworthy fact that when monkeys were tried in a similar maze they did no better than the rats, in fact scarcely as well. But how fallacious it would be to conclude that the rat's intelligence is equal to that of the monkey. However, Mr. Small seems to have been a somewhat cautious investigator, and his work, including observations systematically carried out on the psychic development of young white rats—which he has been good enough to say was suggested by my own series on our domestic mammals and birds—his experiments with the white rat and his discerning criticism of the work of others, had not a little advanced the subject of animal psychology.

In quite another class and altogether less open to criticism, are certain experiments made by Mr. Hobhouse. He ascertained how a dog, left upstairs in a building would get to his master who called him from outside. While some of the laborators have almost wholly ignored the individuality of animals, this criticism does not apply to Mr. Hobhouse. As this writer seems to me to have taken, on the whole, about the broadest, safest and most helpful views of animal intelligence, I feel justified even in so general a treatment of the subject, as the occasion permits in calling further attention to them. Passing by his discussion of instinct for the present, after pointing out that Dr. Thorndike's experiments with cats, dogs and chickens were "quite outside the range of the animal's ordinary experience," he says, "What Mr. Thorndike's experiments prove so far, is not that cats and dogs are invariably educated by the association process, that is by habituation alone, but on the contrary that at least some cats and dogs conform in at least one point to the method of acquisition by concrete experience—they learn in a very few instances."

Mr. Hobhouse was one of the first to recognize clearly, though I do not say adequately, that the success of the animal in certain situations depends largely on the degree to which it can *attend* to anything in hand. It is not sufficient that an animal be stimulated, as by hunger and the sight of food—to instance a favourite stimulus used by the laborators—the animal must, if it would succeed in certain complicated situations, be able to exercise an inhibitory influence and direct its attention to the essential points in the solution of a problem, and in this respect, not only do groups but individuals differ greatly. Speaking generally, the poodle has the power of attention above every other breed of dogs, so far as the learning of tricks is concerned, yet in the hunting field the pointer or setter is incomparably his superior, even in this matter of attention. But there is much in Mr. Hobhouse's generalization, "that an animal can shift its attention to this or that object, or change within the sphere of perception, but it apparently cannot follow out the structure of any complex object with any minuteness and accuracy," and I would add that it is just here that man is so far in advance of the animal and some individuals, especially among men, superior to others.

The experimental examination of this point, so far as animals are concerned, offers an inviting and possibly fruitful field. Mr. Hobhouse found the Rhesus monkey less attentive than his dog, and not more so than the cat. But attention can be cultivated, as was shown by the improvement of this writer's dog Jack. Both the dog and the cat, he tells us, showed a general appreciation of what was to be done, they became excited when preparations were made for a fresh experiment, even if it was of a new kind. Speaking of another dog, Mr. Hobhouse says, "but apparently she was guided by what in the human being we should call common sense," an opinion, which of itself, suffices to show that though conservative he does not belong to the extreme agnostic school of comparative psychology. On p. 222 of his book, Mr. Hobhouse presents the following summary : "On the whole, then it would seem that animals are influenced by similarity of relations. Not that they dissect out the common element which constitutes a class identity; they have not solved the problem which has baffled logicians; it is rather that they have a concrete perception of the man or animal, house or locality, with which they are familiar; that such an object contains many objects in various relations, and that when they meet another object, similar in general character, *i.e.*, really in its constitutive relations to the first, they know how to deal with it. This implies that they have the power of grasping an object as a whole including distinct elements which I have called Concrete Experience, and the power of applying this experience, which I have called

Practical Judgment." And again, he makes the following comprehensive statement, which is worth quoting in full: "However, this may be, we have some ground for thinking that the more intelligent animals have a knowledge of surrounding objects which they apply in action; that they are capable of learning to act in accordance with physical changes which they witness; that they may be influenced by the general similarities which unite individuals of the same class, and can guide their action in dealing with any object by the relation in which it stands to that which they desire. Further, evidence has been brought that in the process by which they learn, not repetition of instance, but concentration of attention is the important point. Lastly, it is suggested that in some cases they not only merely learn to meet a given perception with a certain motor reaction, but also to combine and adapt their actions so as to effect physical changes which, as they have learned, aid them in gaining their ends."

"We have thus gone over all the points enumerated on p. 134, as descriptive of Concrete Experience and Practical Judgment, and have seen some ground for imputing each and all to the higher animals. At no point, perhaps, is the evidence conclusive, but it is to be remembered that these functions are indicated so that evidence of capacity for one is indirect evidence of capacity for another. We have, therefore, a set of independent arguments all pointing in the same direction, and it is on this convergence of evidence rather than on decisive proof at any point, that our hypothesis must rest."

But little credit has been given to animals by the laborators for inhibition or self-restraint. Their experiments were not calculated to bring this quality into bold relief—quite the contrary. Such experiments often tend to cause mental disorder, so that one is not observing the animal at its best, but at its worst. Mr. Hobhouse, however, has not wholly neglected this subject, for he remarks that "the self-restraint of the pointer is the result of severe training, but we must not regard it as the result of mere blind habit superseding blind impulse, for, as Diezel remarks, the same dog who will refrain from following a hare in his master's presence, will eagerly chase it if unobserved. The impulse is not instinct, but is controlled by the knowledge of results."

This subject is another on which fruitful work might be done; and here again one finds the greatest difference between individual animals as also between individual men. The difficulties in carrying out experiments on monkeys, because of their restlessness, are great and Dr. Thorndike and Mr. Kinnaman deserve great credit for their perseverance, though I must say I should not have expected the most satisfactory results from some of their tests. Dr. Thorndike points out that the monkeys represent progress in mental development from the gene-

ralised mammalian type towards man in several directions, as in their sensory and motor equipment, but he is inclined in accordance with his views of animal intelligence and psychology generally to make all things pivot on the association process. He says, "Let us not wonder at the comparative absence of free ideas in the monkeys, much less at the absence of inferences or concepts. Let us not wonder that the only demonstrable intellectual advance of the monkeys over the mammals in general is the change from the few narrowly confined practical associations to an amplitude of all sorts, for that may turn out to be at the bottom the only demonstrable advance of man, an advance which in connection with the brain acting with increased delicacy and irritability brings in its train the functions which mark off human mentality from that of all other animals." And in his paper on the Evolution of the Human Intellect, he expresses the opinion that the "Intellectual evolution of the race consists in the increase of the number, delicacy, complexity, prominence and speed-formation of such associations. In man this increase reaches such a point that apparently a new type of mind results which conceals the real continuity of the process."

I cannot but think myself that this is but a small part—a mere chapter of the whole story, and that by believing this to be the whole we retard progress. I wish to point out, however, that there does not seem to be the same objection to the methods of the laborators when applied to lower vertebrates. Dr. Thorndike's own studies on a fish, *Fundulus*, with a low type of brain; the investigation of Yerkes and Bosworth on the cray-fish; that of Yerkes on the turtle; those on birds by various observers; and others to which the limitations of time do not permit me to allude, all seem to be in the right direction; all the more as in the case of fishes, turtles and other aquatic creatures ordinary observations must, in the nature of the case, be very restricted. We should surely expect that simple association processes would play a larger part in the psychic life of such creatures than in that of mammals. But when it is urged that association processes with instinct explain all, or practically all in the mental make-up of animals, I must enter a most vigorous protest.

Mr. Kinnaman is not sure, as a consequence of his investigations on the monkey, and as Dr. Thorndike believes, that they have no "free ideas"—to use the terminology of the latter, and expresses his views regarding the monkey and animals generally, as follows: "Whether these animals have 'free ideas' and general notions beyond the mere 'recept' and are capable of real analogical reasoning, cannot be positively determined. If they do the processes certainly do not rise to the level of full reflex consciousness. Yet there is no way of knowing, be-

cause there is no certain way of having the consciousness that the animal has. But that these monkeys have often acted objectively just as human beings act when they have these mental activities is most certain. I am inclined to believe that the human and animal consciousness are not really different in kind but only in degree; the difference in degree, however, is very great." Mr. Hobhouse believes that there come points in growth where change of degree becomes change of kind, and refers to the fact that water may become vapour or ice according to the rate of vibration of the constituent molecules. However, analogies are proverbially dangerous.

With this writer's other views on the relation of human and animal intelligence as expressed in the following words, I find myself in accord: "Human intelligence develops out of a lower form by growth in this feature of Comprehension on the one hand and Articulateness on the other, by which the higher stage of animal intelligence was marked off from the lower. Mind, it is suggested, differs from mind in the degree in which these powers are developed, in the experience which it can comprehend and in the articulateness with which it can comprehend it."

A noteworthy recent contribution to our subject is the address of Prof. C. S. Minot to the American Association for the Advancement of Science on "The Problem of Consciousness in its Biological Aspects," from which it appears that the professed psychologists are not doing all the thinking on psychology or philosophy. His general attitude may be understood from the following passage: "We must look to biologists for the mighty generalisations to come rather than to the philosophers, because great new thoughts are generated more by the accumulation of observations than by deep meditation. To know, observe. Observe more and more and in the end you will know. A generalisation is a mountain of observations; from the summit the outlook is broad, the great observers climb to the outlook while the mere thinker struggles to imagine it. The best that can be achieved by sheer thinking on the data of ordinary human experience, we have already as our glorious inheritance. The principal contribution of science to human progress is the recognition of the value of accumulating data which are found outside of ordinary human experience." Minot's cardinal principle is thus expressed: "The function of consciousness is to dislocate in time the reactions from sensations." "Conscious inhibitation is thus distinct from reflex action; the potential reaction may, however, be stored up and effect future conduct. Consciousness has a selective power manifest both in choosing from sensations received at the same time and in combining sensations received at different times. It may make syn-

chronous impression dysynchronous in their effects and dysynchronous impressions synchronous, which statement is but a paraphrase of the original,—the function of consciousness is to dislocate in time the reactions from the sensations."

"Our eyes, ears, taste, etc., are available because they supply consciousness with data. Our nerves, muscles, bones, etc., are available because they enable consciousness to effect the needed reactions." His view of animal consciousness is thus forcibly expressed: "The conception of homology, both of structure and of function lies at the base of all biological science, which must be and remain incomprehensible to any mind not thoroughly imbued with this conception. Unless those who are deficient in this respect can fail to understand that the evidence is overwhelming that animals have a consciousness homologous with the human consciousness, the proof is conclusive. As regards at least mammals—I think we can safely say as regards vertebrates—the proof is the whole sum of our knowledge of the structure, functions and life of these animals. As we descend the animal scale, to lower animals there is no break and therefore no point in the descent where we can say here animal consciousness ends and animals below are without it. It seems inevitable therefore to admit that consciousness extends far down through the animal kingdom, certainly at least as far down as there are animals with sense organs, or even the most rudimentary nervous system. It is unsatisfactory to rely chiefly on the anatomical evidence for the answer to our query. We await eagerly the results from psychological experiments on the lower vertebrates. A sense organ, however, implies consciousness, and since such organs occur among cœlenterates, we are ready to assign consciousness to these animals."

"The series of considerations which we have had before us lead directly to the conclusion that the development and improvement of consciousness has been the most important, really the dominating factor in the evolution of the animal series."

Minot is of those who would not deny consciousness absolutely to even vegetable organisms, for he says: "A frank unbiased study of consciousness must convince every biologist that it is one of the fundamental phenomena of at least animal life, if not, as is quite possible, of all life."

On adjustment and communication between individuals he thus expresses himself: "It is interesting to consider the evolution of adjustment to external reality in its broadest features. In the lowest animals the range of the possible adjustment is very limited. In them not only is a variety of possible actions small, but they cover also a small period

of time. In animals which have acquired a higher organism the adjustments are more complex, both because the reactions are more varied and because they cover a longer period of time. Thus the jelly fish depends upon such food as happens to come within its reach, seizing from moment to moment that which it encounters; but the lobster pursues its food, making complicated movements in order to reach and seize it. One can trap a lobster easily; I doubt if one can trap a jelly fish at all. The next great advance is marked by the establishment of communication between individuals of the same species. About this phenomena we know exceedingly little; the investigation of it is one of the most important duties of the comparative physiologist. Its bionomic value is obviously great for it allows an individual to utilise the experience of another as well as its own. We might indeed compare it with the addition of a new sense, so greatly does it extend the sources of information. The communication between individuals is especially characteristic of vertebrates, and in the higher members of the sub-kingdom it plays a great role in aiding the work of consciousness. In man, owing to articulate speech, the factor of communication has acquired a maximum importance. The value of language, our principal medium of communication, lies in its aiding the adjustment of the individual and the race to external reality. Human evolution is the continuance of animal evolution, and in both the dominant factor has been the increase of the resources available for consciousness."

Professor Minot believes that consciousness is a real and dominant factor in the evolution of animals, that it affects the vital processes : "There is in my opinion no possibility of avoiding the conclusion that consciousness stands in immediate causal relation with physiological processes."

While I may not be ready forthwith to admit that Minot's dictum in regard to consciousness is perfectly satisfactory, it has been gratifying to me to find so many views similar to those which I have been myself accustomed for the past few years to elaborate in my lectures to students, expressed so clearly and vigorously in this address.

H. S. Jennings, who has worked much on the reactions of infusoria, after criticising the conclusions of Hodge and Aikins, which he concludes go too far, refers to Minot's views. He thinks that by this writer's criterion we should clearly have to attribute consciousness to Stentor, for at times this creature inhibits reactions to stimuli, while again it reacts strongly. Jennings is not, however, satisfied with Minot's criterion for he believes that, "Unconscious mechanisms can be constructed and indeed do exist, in which there is a dislocation in time

between the action of an outer agent upon the machine and the reaction of the machine similar to what we find in organisms."

I can do but scant justice to a highly critical, profound and suggestive paper by H. Heath Bawden on "The Psychological Theory of Organic Evolution." He passes in review the work of Binet, Cope, Loeb and others. Professor Loeb lays stress on what he terms "associated memory," by which he means, "that mechanism by which a stimulus brings about not only the effects which its nature and the specific structure of the irritable organ call for, but by which it brings about also the effects of other stimuli which formerly acted upon the organism almost or quite simultaneously with the stimulus in question." Consciousness ceases with "associated memory," as in sleep, anæsthesia, etc. According to this test Loeb fails to find consciousness in Infusoria, Cœlenterates and Worms, and doubtfully in many higher forms. He is quite certain of consciousness only in many of the higher vertebrates. Bawden thinks Loeb errs, and while he believes that this criterion may be good for determining the *degree* of mammalian consciousness, he believes it too restricted to apply to the whole animal kingdom, much less to the plant world. Romanes held that "consciousness was that which enables the organisms to learn to make new adjustments or to modify old ones in accordance with the results of its own individual experience." "Purposiveness means simple adaptation of means to ends; consciousness means the ability to vary the use of means to an end. The former may be quite automatic, the latter alone must be conscious." (Bawden).

Baldwin says, "Consciousness is the new thing in nature, the thing which organisms show in all cases, their latest and finest adjustment and the central fact of consciousness, its prime intrument, its selective agent, its seizing, grasping, relating, assimilating, apperceiving—in short, its accommodating element and process—is attention."

Probably in no direction has more solid advance been made within the last ten years than in the psychology of instinct, impulse, habit and kindred subjects. Professor Lloyd Morgan's best contributions have been in this realm. In this he has been both the observer and the thinker, and his biological training has been at once a preparation for the task and a ground of confidence for the reader of his works. His "Habit and Instinct" embodies much of the best that has been attained in that department. He, however, wisely draws on the stores of others and in these subjects the data are more abundant and reliable probably than in any other department of the whole field. The investigations of the Peckhams on insects deserve in this connection special mention.

All agree that it is here that man and the animals stand on common ground. There is scarcely a prominent writer on human psychology who has not treated at greater or less length of the subject of impulse, instinct and habit. However, a great field is yet open notwithstanding all that has been done, including such bold attempts as that of Professor Baldwin and others, to determine the sphere of these fundamental activities in the course of organic evolution in general.

The limitations of this address will not permit of extended reference to this subject in which some of the best work of the last decade has been done. But at least a word must be said of the investigations of Professor Groos whose books on the play of animals and play in the human being are mines of learning and full of suggestive, highly interesting and generally valuable information. Mr. H. R. Marshall has also quite recently devoted an entire work to the subject of "Instinct and Reason."

It seems to me that development in this subject has been retarded by an inadequate appreciation of what I conceive to be of the greatest moment:—that the qualifications of the investigator are of quite as much importance as the method, probably a great deal more. Professor Groos has thus referred to the equipment of the individual who would study animals in one of their aspects: "The author of the psychology of animal play should have in reality, not alone two but many souls within his breast." He would have him combine with all the varied ideas and experiences of a man who has traversed the round globe, the special knowledge of the director of a zoological garden, and also that of him who has penetrated the life secrets of the forest, and who can moreover take the point of view of a student of æsthetics. If these are the qualifications for a special investigation of animal play, they are surely not less called for in the other realms of comparative psychology. However, many who are not qualified to do the highest kind of work in this department of investigation, can, if they will, make contributions of accurate observations, but they must be slow to draw conclusions and have a saving modesty which can hardly be claimed as the most distinctive characteristic of the present day investigator, but which so often caused Charles Darwin to pause.

To more than one has it seemed desirable that some correlation between the animal and the human mind should be attempted and this could be best done by comparing the former with the human within a relatively short time after birth. Already a goodly store of material is available, but special child study to this end is one of the needs of the hour.

Summary.

The evolution of comparative psychology has followed in the main the evolution of biology and of psychology, and the general trend of human thought.

When man's mental attitude towards nature in general changed, animals also were regarded in a new light.

Until comparatively recently the contributions to the subject have been characterised by many-sidedness, but at the same time by looseness and often inaccuracy, with a tendency to undue credulity and anthropomorphism.

The "experiments" of the laboratory school of comparative psychology have been chiefly valuable in their negative and indirect results. A large proportion of the tests used thus far have been inadequate and often positively misleading; but they have also indicated the directions in which we need not hope to succeed, and suggested more fruitful methods. These experiments have shown that under even unfavourable conditions animals may form new mental associations with surprising rapidity.

The laboratory methods have proved themselves best adapted to the study of invertebrates and the lower vertebrates.

The most fruitful work thus far done has been the observation of the development of animals from birth upward by the consecutive or (fairly) continuous method, together with such experimentation as has been carried out under freer and more natural conditions generally than those under which the laborators worked.

It is important that similar observations and experiments be made on other of our domestic animals and especially on wild animals.

In all cases the investigator should be, if possible, a man with a knowledge of animal life in general, and a special knowledge of the animals to be subjected to critical observation; and if he can combine this with a scientific acquaintance with both biology and psychology, so much the better. The sooner it is realised that the man is as important as the method, the better for the development of comparative psychology.

Much light is likely to come to comparative psychology from judicious child study and it is important that both biologists and psychologists turn towards and if possible work in concert in dealing with so large a field as comparative psychology.

LITERATURE.

LUBBOCK, SIR JOHN.
Ants, Bees and Wasps.
D. Appleton & Co., New York, 1883.
On the Senses, Instincts and Intelligence of Animals. 1897.

ROMANES, G. J.
Animal Intelligence.
Mental Evolution in Man. 1899.

THORNDIKE, E. L.
Animal Intelligence. Monograph, Supplement to Psychological Review 1898.
The Mental Life of the Monkeys.
Ibid., 1901.
The Evolution of the Human Intellect.
Popular Science Monthly, Vol. 60, No. 1, Nov., 1901.
The Intelligence of Monkeys.
Ibid., Vol. 59.

SMALL, W. S.
Notes on the Psychic Development of the Young White Rat.
American Journal of Psychology, Oct., 1899.
Experimental Study of the Mental Processes of the Rat, II.
Ibid., 1901.

HOBHOUSE, L. T.
Mind in Evolution .
MacMillan & Co., 1901.

MILLS, WESLEY.
The Nature and Development of Animal Intelligence.
MacMillan & Co., 1898.
Psychological Review, Vol. VI, No. 3.

KINNAMAN, A. J.
Mental Life of Two Macacus Rhesus Monkeys in Captivity.
American Journal of Psychology, Vol. 13.

MINOT, C. S.
The Problem of Consciousness in its Biological Aspects.
Science, N.S., Vol. 16, No. 392.

JENNINGS, H. S.
Studies on Reactions to Stimuli in Unicellular Organisms.
American Journal of Physiology, Vol. 8, No. 1, 1902.

BAWDEN, H, HEATH.
The Psychological Theory of Organic Evolution.
The Journal of Comparative Neurology, Vol. XI, No. 3, 1901.

COPE, E.
Origin of the Fittest, 1887.
Primary Factors of Organic Evolution, 1895.

LOEB, J.
Comparative Physiology of the Brain and Comparative Psychology, 1900.

BINET, ALFRED.
The Psychic Life of Micro-organisms.

BALDWIN, J. M.
Mental Development of the Child and the Race.
Macmillan and Co., 1895.

MARSHALL, H. R.
Instinct and Reason.
New York, 1898.

PECKHAM, G. W., and E. G.
Instincts and Habits of the Solitary Wasps, 1898.

MORGAN, C. LLOYD.
Habit and Instinct, 1896.
Animal Behaviour, 1900.

LYCÆNA PSEUDARGIOLUS
VAR. NIGRESCENS ♂
THECLA STRIGOSA
VAR. LIPAROPS
PHYCIODES HANHAMI
LYCÆNA PSEUDARGIOLUS
VAR. ARGENTATA ♂
VAR ARGENTATA ♂ (UNDERSIDE)

LYCÆNA PSEUDARGIOLUS
VAR. NIGRESCENS ♀
THECLA STRIGOSA
VAR. LIPAROPS (UNDERSIDE)
PHYCIODES HANHAMI ♀
THECLA HEATHII ♂ (UNDERSIDE)
LYCÆNA PSEUDARGIOLUS
VAR. ARGENTATA ♀

XIV.—*Descriptions of some New Species and Varieties of Canadian Butterflies.*

By JAMES FLETCHER, LL.D., F.L.S.

(Read May 19, 1903.)

I submit herewith descriptions of 3 species and 3 varieties of Canadian diurnal lepidoptera, specimens of which have been in my collection for many years, and of which a continued study convinces me that it is wise to characterize them for the benefit of other students of Canadian butterflies. It is possible that some of these may be only local races, but they are so constant that I believe them to be well worthy of recognition. In describing these forms, I have endeavoured to compare them with their nearest allies, as a description, even when accompanied by a plate, is far more intelligible when a new form can be compared with a well known standard. My thanks are due to Dr. Henry Skinner, of Philadelphia, who very kindly undertook the arrangement and preparation of the specimens illustrated on the plate given herewith, and also from his own cabinet provided some specimens which were better for illustration than the actual types used in the descriptions. I have also to express my gratitude to the American Museum of Natural History for a beautiful painting of *Thecla heathii* which was specially made for the purpose and used for the accompanying illustration, on account of two of the wings in the type specimen being imperfect. It is well here to mention that this painting is, in my opinion, almost as perfect as a drawing can be and represents exactly the appearance of the type in every mark and spot as well as in colour and shape. Mr. Wm. Beutenmuller very kindly undertook personally the supervision of this painting.

The names used in this paper are those in the recognized check lists of diurnal lepidoptera now used by American entomologists, viz.: the "List of Lepidoptera of Boreal America," by Dr. J. B. Smith, 1891, and "A Synonymic Catalogue of the North American Rhopalocera," by Dr. Henry Skinner, 1898. Up to the present time the names given by Dr. S. H. Scudder in his magnificent work "The Butterflies of the Eastern United States and Canada," have not been adopted by collectors in labelling their collections. These names, however, are, I believe, for the most part well founded, and it is merely a matter of time before they will be generally accepted.

Phyciodes hanhami, n. sp.

(Hanham's Crescent.)

Sexes similar both in colour and markings. Alar expanse, males 37-38 mm., females 40-43.50 mm.

Upperside. Wings bright orange fulvous darkened towards base and bordered with a clear black margin, which is widest at apex of primaries. The base and cell marked as in *P. nycteis* and with the same "tangle of black lines" mentioned by Dr. Scudder in his description of that species; the basal area, however, is never so black as in *nycteis* and in some specimens the ground colour is hardly darkened at all. All the veins of both wings are lined with dark brown.

Fig. 1.—P. nycteis, Db.-Hew.

The white marks of the under surfaces of both wings are repeated above as light yellowish contrasting spots, giving the species a much brighter appearance than *nycteis,* in which this feature does not occur even in the forms of that variable species where the fulvous colour predominates on the upper surface. A striking character in which *Hanhami* differs from both *P. nycteis* and *Melitæa harrisii,* a species which it also resembles, is the absence on the secondaries, above, of the median black line which in those species divides the fulvous discal area on almost all specimens. There is a more or less complete series of submarginal ocelli in the interspaces between the submarginal and median veins, but these are smaller and less distinct than in the two species named and in some specimens are obsolete. Fringes white, interrupted with black at the tips of the nervures. *Underside.* Fore-wings fulvous brown, marked with brown streaks and pale spots after the pattern of *M. harrisii,* but much paler and less contrasting, owing to the absence of black marks. Apical area very little darkened. There is a submarginal series of nacreous lunules in all the interspaces except the lowest, and inside this a sinuous series of pale spots. Margin fulvous, narrow, wider than in *nycteis,* but always narrower and more regular than in *M. harrisii.* Hind wings with colour areas distributed as in *nycteis,* but much less contrasting, the basal area being bright fulvous and the brown field at apical margin less intense in colour. At base

are 5 large nacreous spots and a dash inside the internal vein. The triple mesial band is wide, distinct, and nacreous, the spots of the same shape and comparative length as in *nycteis*; but the outer transverse traversing line is somewhat angled where it crosses the nervules, that is, is made up of short, almost straight dashes as in *M. harrisii*, not of rounded crenations as in *nycteis*. The outer margin of this band is, as in *nycteis*, not clearly defined, a character in which both of these species differ from *M. harrisii*, where this is distinctly the case. Beyond the mesial band is a row of 5 ocelli, the central one of which is white, ringed with brown, and the two outer ones on each side of this are black, shaded inwardly with fulvous and pupilled with white. The most conspicuous character of this species and one by which it is easily separated from *nycteis*, is the complete series of large marginal silvery lunules which occur on every interspace, as in *M. harrisii*. In *hanhami*, as in *nycteis*, the pattern below is outlined in brown, while in *harrisii* the margins of the spots are black, thus producing the well-defined and distinct pattern which is characteristic of that species. Body above black, fulvous on sides, silvery beneath. Abdomen banded narrowly with white, above. Antennæ black above, banded with white, bright fulvous beneath. Palpi silvery white, fulvous at tips. I must acknowledge that I refer this species with some hesitation to the old genus *Phyciodes*. The general appearance and venation seem to make it congeneric with *nycteis*; but, at the same time, the upper sides of some specimens resemble closely extreme forms of *M. harrisii*, in which the yellow colour predominates, and in addition, the shape of most of the markings beneath is similar to those of that species. On examining a good series of specimens, the venation comes rather under the genus *Charidryas*, characterized by Scudder, and as figured by Holland in the Butterfly book, than under *Cinclidia*. Although, as stated, the markings resemble more closely those of *harrisii* in shape, the distribution of the colour areas is more as in *nycteis*. There is also in the mottled appearance of the underside a resemblance to *P. mylitta* which is congeneric with *nycteis*.

Distribution: Manitoba (Eastern, Central and Southern), Minnesota. The first specimens of this insect seen by me were in the collection of Mr. A. W. Hanham, at Winnipeg near which place, at Bird's Hill, he had taken them late in June, 1895. Subsequently I took several specimens at the same place and at Brandon in the beginning of July. Mr. L. E. Marmont finds the species not uncommon at Rounthwaite, Man., and Mr. Norman Criddle takes it also at Aweme, Man. Dr. Wm. Barnes writes me that he has specimens from near Minneapolis, Min.

Described from 12 specimens (6 males and 6 females). The types of both sexes, which are figured, are deposited in the U. S. National Museum, at Washington. The species is named after Mr. A. W. Hanham, an enthusiastic and indefatigable collector, who has done so much towards working up the insect fauna of Manitoba and British Columbia.

THECLA STRIGOSA, Harr., var. LIPAROPS, n. var.

(The Bright-eyed Hair-streak.)

In the Canadian Entomologist for November, 1895, p. 315, I referred to the Manitoban form of *Thecla strigosa* and expressed the opinion that this form was worthy of at least varietal recognition. This, as far as I have seen, always shows the large, rich fulvous, well defined blotches which are represented on the plate herewith. The ordinary form of *T. strigosa* is shown in the accompanying woodcut. (Fig. 2.)

I have examined during the last fifteen years a great many specimens of this variety from Manitoba, and all without exception showed the two large fulvous eye-like spots on the primaries. Mr. E. F. Heath, who formerly took the insect in numbers at Cartwright, Man., writes: — "I have never taken this form without the fulvous patch on the primaries in both sexes, and I have certainly taken and seen over one hundred specimens. Four or five years ago and for years prior to that it was very abundant here; now it seems to have disappeared. I do not come across one in a season."

Mr. L. E. Marmont, of Rounthwaite, Man., who has lived and collected in Manitoba for many years, writes: — "I have only 9 specimens of your variety *liparops* of *strigosa* just now; but all have the large fulvous blotch on the fore wings. In one female it is fainter than the others, but quite noticeable; in another female the primaries are almost entirely fulvous with only a blackish border."

Fig. 2.—THECLA STRIGOSA, Harris, Eastern form.

Occasional specimens of the eastern *T. strigosa* show a more or less poorly defined fulvous blotch on the upper side of primaries, but such specimens in my experience have proved to be of decidedly rare occurrence. Dr. Scudder thinks that Boisduval and Leconte intended to represent under the name of *T. liparops*[1] what we now know as T. *strigosa,* Harris. I can hardly think that this is the case; but it seems well to preserve the name; so, I suggest that it should be used for the variety found in Manitoba, which

[1] Histoire générale et iconographique des Lépidoptères, p. 99; Pl. 31, fig. 1.

constantly shows on the primaries above a bright clearly defined blotch, and this was the chief character from which the name *liparops* was derived. On discussing the reference by Dr. Scudder of Harris's *strigosa* to Boisduval and Leconte's plate, with Mr. W. H. Edwards some years ago, the latter wrote as follows: "Scudder says this is *strigosa* of Harris, but no one would know it from the figures. The description is done from the figure and not from the insect; therefore, *liparops* represents no insect but merely the said figure, and for that reason I reject the name. The first time the insect was described was by Harris, and his name prevails." In addition to the large and handsome golden fulvous, almost quadrate patch which occupies nearly half the area of the primaries, the secondaries are also frequently ornamented with a fulvous cloud at the anal end, near the tails. The underside of the western form is of a darker brown than in the type, with the white lines much paler, these in some specimens being almost obliterated.

Described from 10 specimens taken at several places in Manitoba: Beulah (Dennis); Cartwright (Heath); Aweme (Criddle); Brandon (Fletcher); Rounthwaite (Marmont).

The types described herewith are deposited in the United States National Museum, at Washington.

THECLA HEATHII, n. sp.

(Heath's Hair-streak.)

Described from one female (not a male, as stated on the plate) Alar expanse, 26 mm.

Upperside. Blackish brown (when taken), as in *T. calanus.* Costa at base finely edged in front with yellow as in *calanus* and *acadica.*

Underside. Fawn brown, faintly washed with white from the base almost up to a submarginal band of large pearly gray blotches which occur on all the wings. On the primaries, these are four in number and ovate. On the secondaries, there are five square blotches and a long whitish spur running up the inner margin. Exterior to these blotches is an incomplete series of marginal lunules, as in several other allied species of the genus; consisting of, at the anal angle, between the internal and submedian veins, a few scarlet scales shaded exteriorly with as many white ones and bordered inside and outside with black; between the submedian and first median veins is a large, wide and shallow white lunule, without any scarlet scales; between the first and second median veins, a scarlet crescent outlined on both sides

with black and shaded externally with white; between the second and third median veins is a small red lunule one-third the size of the last, shaded externally with white.

The specimen here described and figured has no tails to the secondaries, but, from the appearance of the ends of the veins and the marginal pattern, as well as the presence of a few longer scales at the end of the first median vein, I have no doubt that originally tails existed.

On the primaries the ovate blotches are bordered on each side by a broad band about two-thirds their own width, and darker than the ground colour of the wings. On the secondaries the series of square blotches is outlined on both sides by an almost black angulated line. Beyond the cell on all the wings is a large, dark, oblong quadrate blotch; the fringe on all wings is dark. Eyes ringed with pearly white; palpi white, tipped beneath with black; antennæ black, ringed with white; club orange below and at the tip.

Locality.— The type was taken by Mr. E. Firmstone Heath near his home in the picturesque valley of the Long River, a few miles from Cartwright, in Southern Manitoba. This spot is about ten miles north of the boundary of North Dakota and about twenty-five miles north-east of the Turtle Mountains. This valley, near Mr. Heath's house, is about a mile wide and is well wooded with scrub oaks (*Quercus macrocarpa*), ash-leaved maples (*Acer Negundo*), aspen and balsam poplars (*Populus tremuloides* and *P. balsamifera*), Saskatoon-berry (*Amelanchier alnifolia*), white thorn (*Cratægus coccinea*), wolf-berry (*Symphoricarpus occidentalis*), prairie roses, wild plum (*Prunus nigra*), a few American elms, choke-cherries and various willows. Mr. Heath tells me that it was taken in July about twenty-five years ago, and, although he has been keenly on the look out ever since, he has never seen another specimen. It is a remarkable form, and, as will be seen from the accompanying plate, which is an excellent representation, bears very little resemblance to any described species.

The species of *Thecla* occurring at Cartwright at the season *T. heathii* was taken, are *T. acadica, T. calanus, T. strigosa,* var. *liparops,* and *T. titus.* The pattern of the underside of the insect here described in no way resembles that of any of these, and I can hardly think that it is a suffused albinic variety of any of them.

The type which was generously presented to me by Mr. Heath, after whom it is named, is deposited in the United States National Museum at Washington. The painting from which the figure in the plate was made, is in my own collection.

secondaries, very similar to the underside of the British Columbian *P. agricola*. The mesial band is dull yellow, inconspicuous, angled and irregular, composed of the same squarish spots as in *manitoba*. These are perhaps normally 8 in number as in *manitoba* when all are present, but this is seldom the case in this species. I have only eight specimens before me at the present time: in one of these there are seven spots and a trace of the eighth; in one specimen there are seven, in five six, and in one five. The spots of the lower portion of the band, when present and of full size, confluent or nearly so, the two spots at the angle of the band usually smaller than the others. The large V-shaped spot, so conspicuous in the cell of *manitoba*, is inconspicuous and frequently absent. The spot at the base of the submedian interspace seldom present or very small. In the males the light colour of the spots has a tendency to run out along the veins, both towards the margin and to the base of the wings, in the same way as in *P. uncas*.

Alar expanse, males 28-31 mm., females 30-32 mm.

Locality: Up to the present time I have only taken this species at Nepigon, Ont., and Sudbury, Ont. Specimens sent to Mr. Henry Edwards many years ago were at first named by him *Pamphila sylvanoides*, but he subsequently wrote to me: "Your northern Ontario *Pamphila* is not *sylvanoides*, but must come nearer to one of the forms of *comma*, such as *manitoba* or *colorado;* but the underside shows that it is quite distinct from either of these."

P. manitoboides occurs at Nepigon, as stated above, from the third week in June until the middle of July. A month or six weeks later than this the true *P. manitoba* appears, which is a rather larger insect, with a greenish tinge on the underside and distinct silvery white markings. The eggs of *P. manitoboides* hatch about a fortnight after they are laid, but, as has been shown by the Rev. T. W. Fyles [Canadian Entomologist XXVII (1895), p. 346], the eggs of *manitoba* laid in August do not hatch until the following spring. The larva of *manitoboides*, as described by me in the Report of the Entomological Society for 1888, does not quite agree with Dr. Fyles's description of *P. manitoba*. I have no idea that this species is very closely related to *P. manitoba*, and the name was only given to indicate a somewhat close resemblance on the upper side to that species. I did not intend, when publishing the description of the larva, that the name *manitoboides* should stand, and particularly mentioned in the article referred to, that, as I did not wish to cause confusion by naming what might prove to be a described species in a difficult genus which I had not specially studied, I refrained from further describing the perfect insect. Unfortunately, this precaution seems to have been unavailing, for several have written to me for further information on

the species; and, as the name has been introduced into published lists of North American Lepidoptera, I have thought it best to prepare the description here submitted, particularly as further study has convinced me that the species here named does not agree with any of the described species of this genus.

Described from 9 specimens (3 males and 6 females). Types of both sexes deposited in the U. S. National Museum.

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